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AD-A158 240

# Defense Financial and Investment Review



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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
	AD-A158 240	
4. TITLE (and Subtitle) DEFENSE FINANCIAL AND INVESTMENT REVIEW		5. TYPE OF REPORT & PERIOD COVERED Final Report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Department of Defense		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Deputy Under Secretary of Defense (Acquisition Management) - DUSD(AM/DFAIR) Pentagon, Room 3E144 Washington, D. C. 20301		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Deputy Under Secretary of Defense (Acquisition Management) - DUSD(AM), The Pentagon, Room 3E144 Washington, D. C. 20301		12. REPORT DATE June 1985
		13. NUMBER OF PAGES 206
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Public Release <div style="border: 1px solid black; padding: 5px; display: inline-block;">           This document is classified            for public release and its            distribution is unlimited.         </div>		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Capital Investment      Progress Payments Contract Financing      Weighted Guidelines Contract Pricing Profit Policy Pricing		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Defense Financial and Investment Review (DFAIR) was chartered by the Deputy Secretary of Defense to study contract pricing, financing and profit (markup) policies. Financial data covering the years 1975-1983 were collected and analyzed by the DFAIR and compared with similar data collected during the 1970-1974 period for the Profit '76 study. Comparisons were also made with the financial results of durable goods manufacturers, and with the commercial work performed by defense contractor segments. (continued next page)		

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20. Continued - ABSTRACT

Analysis of industry financial and investment trends indicates that the goals of many of the previous policy changes are being realized, although there are a number of refinements and improvements which need to be made. The final report of DFAIR is based on data from many sources. Four appendices (in separate volumes) contain much of the source data. The appendices are not required to understand the report, but they would be useful to anyone interested in doing further research in the subject area.

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## FOREWORD

In December 1983, the Deputy Secretary of Defense established the Defense Financial and Investment Review (DFAIR). The DFAIR is the first DoD study chartered to review the interrelationship of pricing, financing, and markup (profit) policies and to make recommendations to provide for appropriate integration of the policies.

From January 1984 through its completion in June 1985, the DFAIR was conducted under the guidance of a steering group consisting of:

Mary Ann Gilleece - Deputy Under Secretary of Defense (Acquisition Management), Chairperson  
Major General David Stallings, USA - Deputy Chief of Staff for Procurement and Production, Army Materiel Command  
Rear Admiral Joseph Sansone, USN - Executive Director for Contracts and Business Management, Office of Naval Acquisition Support  
Major General Bernard Weiss, USAF - Director of Contracting and Manufacturing Policy, HQ, USAF  
Major General Joseph Connolly, USAF - Deputy Director (AM), Defense Logistics Agency  
Joseph Kammerer - Deputy Assistant Secretary of Defense (Cost and Audit)  
Charles Starrett - Director, Defense Contract Audit Agency

The day-to-day conduct of the review was performed by the DFAIR team consisting of:

Colonel Ronald Finkbiner, USAF - OUSDR&E(AM), Director  
Carol Frick - Army  
Joseph Sousa - Navy  
Major Robert Gustin, USAF - Air Force  
Delbert Traeger - Defense Logistics Agency  
Adam DiGiovanni - Defense Contract Audit Agency  
Jessie LeCount - Administrative Assistant  
Mary Meadows - Secretary

Very able support was provided to the DFAIR by the Defense Manpower Data Center, the Logistics Management Institute, Touche Ross and Company, and the Conference Board. In addition, the review could not have been accomplished without the active support and thoughtful participation of hundreds of professionals from government, industry, and academia. We are grateful for their participation, as it greatly aided our understanding of these complex issues. Three Air Force officers in particular, volunteered hundreds of hours of their personal time for assisting in the research effort and are to be commended for their outstanding contribution. They are: Lieutenant Colonel Richard Wall, Major Terry Raney and Lieutenant Wayne Schatz.





A special thanks is due to the 76 corporations who provided the validated defense financial data which was so essential to the success of the DFAIR. They are:

AEL Industries, Inc.	ICI Americas, Inc.
AT&T	ITT Corporation
Aeronautical Radio, Inc.	Kaman Corporation
Allied Corporation	LTV Corporation
Arvin Industries	Lear Siegler, Inc.
Atlantic Research Corporation	Litton Industries, Inc.
Avco Corporation	Lockheed Corporation
BDM International, Inc.	Logicon, Inc.
Boeing Company, The	Martin Marietta Corporation
CACI	McDonnell Douglas Corporation
Cincinnati Electronics	Mine Safety Appliances Company
Colt Industries, Inc.	Morrison Knudsen Company, Inc.
Computer Sciences Corporation	Morton Thiokol, Inc.
Control Data Corporation	Motorola, Inc.
E-Systems, Inc.	NI Industries
EG&G, Inc.	Norfolk Shipbuilding & Drydock Company
Eaton Corporation	North American Philips Corporation
Edo Corporation	Northrop Corporation
Emerson Electric Company	Pan American World Services, Inc.
FMC Corporation	Penn Central Corporation
Fairchild Industries, Inc.	RCA Corporation
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General Dynamics Corporation	Singer Company
General Electric Company	Sperry Corporation
General Motors Corporation	Sun Chemical Corporation
General Tire and Rubber Company, The	Sverdrup Technology, Inc.
Goodyear Tire and Rubber Company, The	TRW, Inc.
Gould, Inc.	Talley Industries, Inc.
Grumman Corporation	Tenneco, Inc.
Harris Corporation	Texas Instruments, Inc.
Harsco Corporation	Todd Shipyards Corporation
Hazeltine Corporation	United Industrial Corporation
Hercules, Inc.	United Technologies Corporation
Honeywell, Inc.	Watkins-Johnson Company
Hughes Aircraft Company	Westinghouse Electric Corporation
IBM Corporation	Williams International Corporation

While the conclusions and recommendations derived from the analysis are the responsibility of the DFAIR team, we believe they offer a sound and equitable integration of contract pricing, financing, and man' up policies.



Ronald R. Finkbiner  
Colonel, USAF  
Director, DFAIR

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## EXECUTIVE SUMMARY

The Defense Financial And Investment Review was chartered to study contract pricing, financing and profit (markup) policies to determine if they are resulting in effective and efficient spending of public funds and maintaining the viability of the defense industrial base, and to make recommendations for improvements.

The review was confined to examining the results of the application of those policies by Government personnel, along with a review of defense contractor financial results achieved in performing contracts which are negotiated based on those policies. Data were examined from both Government and private sources, including questionnaires and financial data collection instruments specifically designed to elicit information bearing on the policies being studied.

Financial data covering the years 1975-1983 were collected and analyzed by the DFAIR and compared with similar data collected during the 1970-1974 period for the Profit '76 study. Comparisons were also made with the financial results of durable goods manufacturers, and with the commercial work performed by defense contractor segments.

In general, the DFAIR analysis concludes that current contract pricing, financing, and markup policies are balanced economically, are protecting the interests of the taxpayer, and are enabling U.S. industry to achieve an equitable return for its involvement in defense business. Analysis of industry financial and investment trends indicates that the goals of many of the previous policy changes are being realized, although there are a number of refinements and improvements which need to be made.

The major conclusions and recommendations of DFAIR are summarized below. Additional information is contained in the body of the report.

## CONCLUSIONS

### Equity of DoD Financing Policies

- o In comparison to an analysis of contractor working capital costs resulting from DoD financing policies since 1954, the recent policy of progress payments of 90% for large business and 95% for small business was equitable for the years covered by the study. With short-term interest rates around 10% and projected to decline, progress payment rates should be set at 85 and 90% for large and small business respectively.
- o Current markup policy does not explicitly take into account the cost of working capital.
- o Time to payment is a significant variable insofar as contractors' cost of working capital is concerned.

### Profitability of Defense Contracts

- o Economic profits of defense work were very similar to those of comparable durable goods manufacturers for the years 1970-1979. For the period 1980-1983, average defense profitability decreased slightly from the previous 10-year period while that of durable goods manufacturers deteriorated dramatically. Defense industries were able to maintain their profitability primarily because of the increase in defense outlays and the decline in inflation.
- o Profitability of defense contracts has been consistently lower than the levels believed to have been negotiated by Government contracting officers.
- o FMS profits are greater than they are on DoD work while profits on DoD subcontracts are slightly less than on DoD prime contract work.
- o CAS 414 "Cost of Money" has not caused a significant increase in profits.
- o DoD's Weighted Guidelines markup policy is being followed by contracting officers, but it is in need of improvement.

### Capital Investment and Efficiency Improvements

- o Significant capital investments have been made by defense contractors.
- o The rate of change in capital investment has been driven by factors other than DoD markup policy.
- o Current markup policy is indifferent to productivity of capital investments.
- o Markup policy, in and of itself, is insufficient to bring about productivity-enhancing improvements. Other methods are required.

### Other Subjects

- o Shipbuilding contract pricing, financing and markup policies need re-examination.
- o FMS contract pricing, financing and markup policies need to be adjusted to approximate more closely DoD contract policy.
- o The nature and health of the subcontractor industrial base is not well understood.

## RECOMMENDATIONS

### Contract Financing Policy

- o Progress payment rates, timing and frequency should be established as follows:

	<u>NOW</u>	<u>REVISE TO</u>
Large Business	80%	85%
Small Business	90%	90%
FMS (Large Business)	95%	85%
FMS (Small Business)	100%	90%
Flexible Progress Payment Investment Criteria	15%	15%
Maximum Flexible Progress Payment Rate	100%	100%
Frequency	Monthly	Monthly
Payment Time After Billing	5-10 days	5-10 days
Payment Time After Delivery Billing	15 days	30 days

- o Interest expense should remain unallowable and progress payment rates should be reset in the future based on changes in interest rates.

### Markup (Profit) Policy

- o The overall policy should be simplified and better integrated with financing policy and length of contract performance. A policy framework has been developed to achieve the following objectives:
  - Increase emphasis on investment and decrease emphasis on cost in the markup policy and narrow the range of factors.
  - Markup policy should yield results which are on average .5 to 1% of current allowable costs lower than for the 1981-83 period.
  - The current special factors should be rescinded, but a special factor for FMS risk should be established.
  - Markup on facilities capital employed should be based on productivity and risk of assets.
  - Provide an explicit, but simple, method to calculate a cost of working capital markup amount.

### Other Pricing and Allowable Cost Issues

- o Milestone or interim acceptance payments should be permitted on large dollar contracts where there are more than three years from contract start to first delivery. Milestones or interim acceptances should be:



- Scheduled to commence not earlier than six months after contract start.
- Based on clearly identifiable events whose completion can be verified and whose costs can be reasonably estimated.
- Should occur not more frequently than monthly and preferably on a quarterly basis.
- o Economic price adjustment clauses should be used on all large dollar contracts whose period of performance is three years or longer.
- o Cost of money should continue to be treated as an allowable cost.

#### **Capital Investment and Productivity Improvements**

- o Efforts to motivate contractors to acquire productivity-enhancing capital and to make other productivity changes should be pursued on an extra-contractual, plant-wide basis.

#### **Shipbuilding**

- o The Navy should re-examine its current shipbuilding pricing, financing, and markup policies with the objective of making them conform to the above recommendations.

#### **Subcontractors**

- o DoD should better define critical needs from the subcontracting base and provide productivity-enhancing incentives directly with critical subcontractors and/or assure that prime contractors are doing so.

#### **Feedback and Future Monitoring System**

- o The negotiated markup reporting system (DD Form 1499) needs to be strengthened.
- o Actual results being achieved under DoD contracts also need to be reported on a periodic basis.

## CHAPTER I

### INTRODUCTION

The Defense Financial And Investment Review (DFAIR) was chartered on 2 Dec 1983 to study and make recommendations to the Deputy Secretary of Defense on contract pricing, financing and profit policies. (1)

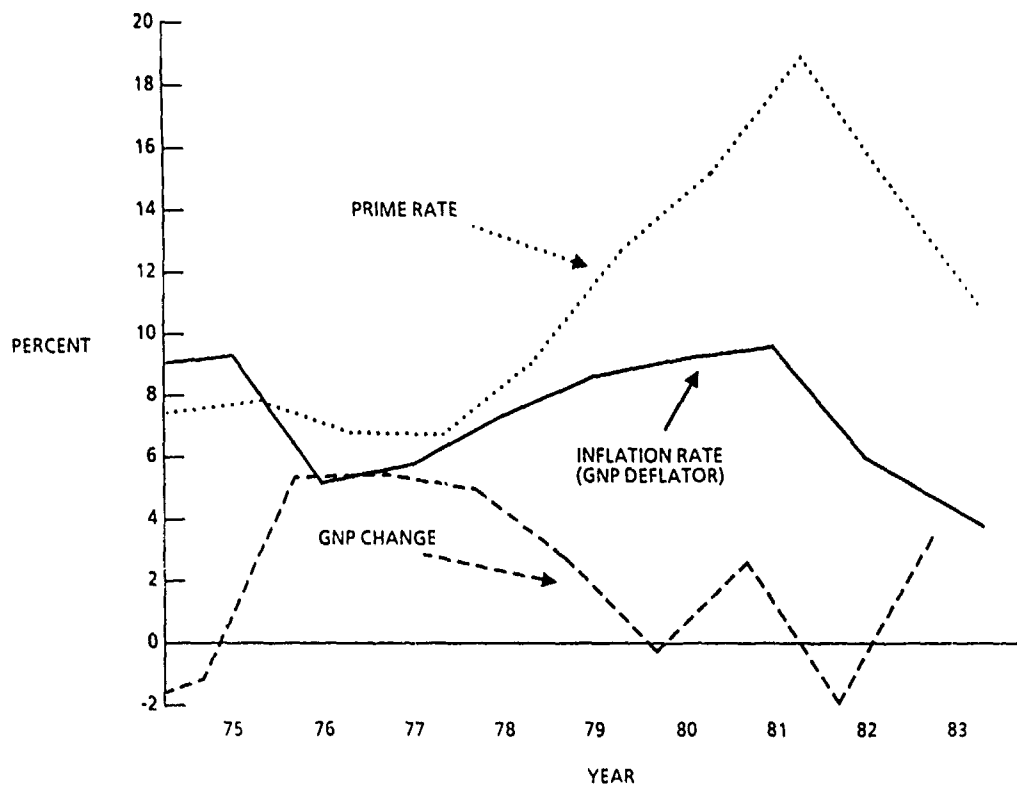
The DFAIR was to ascertain if current policies were achieving the objectives of Executive Order 12352 "Federal Procurement Reforms" requiring reform of federal procurement practices to insure the effective and efficient spending of public funds and at the same time were sufficient to maintain the viability of the defense industrial base. It was expected that the DFAIR would recommend improvements in these policies which would "directly and favorably act to strengthen our competitive industrial base and achieve reduced costs for defense goods."

In part, the study was prompted by trends in the economic environment during the past five to ten years and a lack of complete visibility of the impact those trends were having on the defense industry. The last similar major study was Profit '76, which culminated in a change to the DoD markup (profit) policy based upon a review of defense contractor financial results during 1970-1974. Since then there have been a few minor adjustments to the profit policy, as well as the development of a policy covering contractor investment incentives, three changes in progress payment policy and various changes in the cost allowability rules which affect DoD contract pricing policy.

Since Profit '76 there have been substantial shifts in the economic environment which have had an impact upon American industry, both defense and nondefense, in differing ways. On the one hand, the economy as a whole experienced a rapid increase in the rate of inflation during the 1970's coupled with wide swings in interest rates. This culminated in a recession during the 1980 through 1983 time period which some economists describe as the most severe since the great depression. The recession tended to moderate the rate of inflation and bring down interest rates to lower but still historically high levels as is shown on Exhibit 1.

## EXHIBIT 1

### GNP CHANGE, INFLATION, AND PRIME RATE



Sources: Department of Commerce, Bureau of Economic Analysis (DoC, BEA)

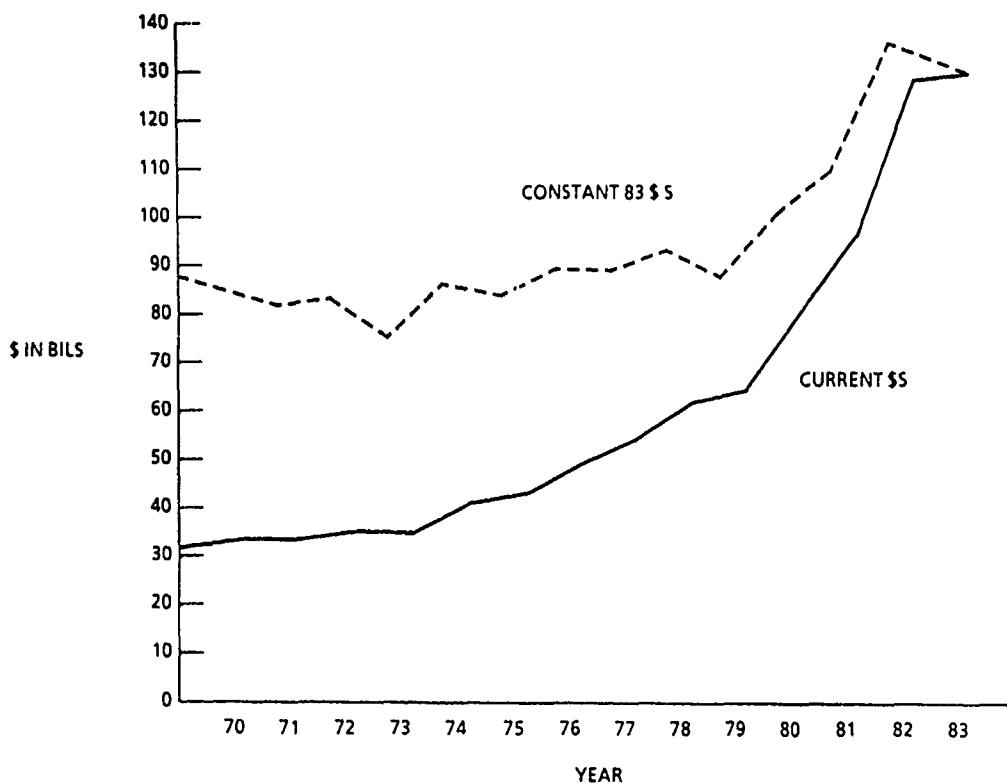
The defense industry also had to contend with high inflation and high interest rates during the 1970's and this gave rise to many concerns in both industry and government about the continuing health of the defense industry and its ability to respond to defense needs. For example:

- Extensive hearings on this issue were conducted in 1980 before the Committee on Armed Services and the Panel on Defense Industrial Base of the Committee on Armed Services of the House of Representatives culminating in a report by the panel entitled "The Ailing Defense Industrial Base: Unready for Crisis." (2)
- These concerns were addressed by the Deputy Secretary of Defense in an April 30, 1981 Memorandum, Subject: "Improving the Acquisition Process" wherein he issued 32 initiatives to redress the problems. (3)

The need to redress these problems was even more acute due to the rapid increase in defense expenditures associated with the current program to modernize weapon systems and provide increased readiness and support to our forces. Exhibit 2 illustrates the rate of DoD obligations covering the period of the study and a comparison with Exhibit 1 demonstrates there were dramatically different "business cycles" for the defense industry and the rest of American industry during the period.

## EXHIBIT 2

### DoD PRIME CONTRACT AWARDS



Sources: DoC, BEA; OSD Comptroller

In recent years there has been much public discussion about these issues and their consequences:

- The Federal Deficit and its long-term implications for the economy is of great concern. Partly because of this, the need for and cost of the defense buildup has been hotly debated.

- Government management of the expenditure of tax dollars has been and continues to be closely scrutinized. For example, the President's Private Sector Survey on Cost Control (Grace Commission) provided several hundred recommendations for improvement, some of which bear directly on the subjects being examined by DFAIR.
- The current administration's emphasis on identifying and eliminating fraud, waste and abuse has resulted in many more resources being devoted to the inspector general and other self-examination activities and a heightened public awareness of problems in DoD procurement. It should be noted that the DFAIR study was not intended to prove or disprove whether fraud, waste, and abuse exist, but rather to gather data sufficient to examine the overall results of doing business with the Department of Defense in light of current and past conditions. As will be noted in subsequent portions of the report, this increased scrutiny has had an impact on the procurement process and the way it is viewed by both government and industry participants.

### Study Plan

Contract pricing, financing and profit (markup) policies are very much interrelated, and because of this it was necessary to examine the policies and their results on an integrated basis rather than as separate functions.

The major issues to be covered by the study were the following:

- Determine the equity of DoD financing policies as provided through progress payments.
- Determine the effectiveness of DoD policies to encourage contractor cost efficiencies, either through improved processes or through increased capital investment.
- Determine the profitability of defense work and its reasonableness in comparison to DoD policies, and the profitability of the nondefense sector.
- Determine and describe the interrelationship of all of the above so that any recommended changes in these policies would be designed to achieve their intended results.
- Investigate the feasibility of establishing a feedback/monitoring system to preclude the need for ad hoc studies such as this in the future.

In order to achieve a comprehensive assessment of the results of the policies, the study group was to gather extensive subjective and empirical data from industry and other governmental sources and to review other reports on these subjects from industry, the Government and academia. At the conclusion of the data gathering phase, the study group was to evaluate the policies by examining the interrelationships of the data and their implications and to recommend policy changes if they were required.

The study group director was authorized to communicate directly with the Military Departments, the General Accounting Office, Congressional staffs, industry associations, and other concerned agencies in and out of the Government. By maintaining a free and open dialog with others concerned about these subjects, it was expected that the results of the study effort would be well balanced and highly credible. During the 17-month span of the study, the DFAIR study group has had dozens of meetings with the above-mentioned organizations and has found this to have been very worthwhile in structuring the data collection effort and focusing on the most pertinent questions.

## CHAPTER II

### RESEARCH METHODOLOGY

In the Defense Financial And Investment Review, the techniques used to evaluate DoD policies and practices were similar to those used for Profit '76. (4) This was considered essential so that statistical analyses and trends developed under Profit '76 could be compared and updated with the current data. The techniques used essentially consist of obtaining opinions and comments from people familiar with, and responsible for, implementing DoD contract pricing, financing, and profit policies and then testing the results of these policy implementations through statistical data comparisons.

Subsequent sections of this chapter describe the methods used to assess the DoD policies and practices. The findings and conclusions from the surveys and analyses performed are incorporated in the various chapters of this report.

#### Contractor Data Analysis

To assess the financial effect of DoD policies and revisions thereto, contractor sales, cost, profit, and investment data were obtained from major defense contractors on a voluntary basis. The data collected were in a format compatible with data collected and used for Profit '76 so that changes since the Profit '76 study could be evaluated. The data were collected for a nine year period, with more detailed data provided in the recent years.

One hundred and twenty-six (126) contractors were requested to submit their financial data. This sample was selected based on the dollar amount of contract actions they received during the years 1980 through 1983. In these four years (1980-83), the contract actions in excess of \$25,000 as reported on DD Forms 350 for selected commodities amounted to \$284.8 billion. The selected commodities were airframe, aircraft engines, missiles and space launch vehicles, weapons, electronic and communication equipment, ships, vehicles, ammunition, supplies and equipment, and services. This universe of selected contract actions also excluded actions for intra-Government effort, non-profit institutions, and performance or purchase outside the United States. From this universe of \$284.8 billion, the negotiated contract actions in excess of \$100 thousand represented by the 126 contractors requested to participate in the study amounted to \$210.9 billion, or 74 percent.

Complete and validated data were submitted by 76 or 60.3% of the 126 contractors. These 76 contractors represented \$193.2 billion, or 91.6%, of the sample dollars. Also, the 76 contractors included 50 of the 64 that participated in Profit '76.

The contractors were requested to submit their financial data by operating segment for segments that had sales under DoD negotiated contracts during any one of the last three years that were twenty-five percent or more

of total segment sales or amounted to more than \$50 million. If a contractor had more than five segments that met the criteria, data were to be submitted for the five segments having the most DoD business. As a result, the data reported by the 76 contractors represents 194 segments.

The Data Collection Form, instructions developed for contractors' data submissions, and summaries of the data are included as Appendix 1.

### Opinion Survey of Contractors

The opinions of defense contractors were also sought regarding DoD policies and practices. Of particular interest were any recommendations for DoD policy change that could contribute to the goal of more cost effective purchasing while preserving the defense industrial base. This survey was accomplished by interviewing chief executive officers and chief financial officers of major weapons systems contractors. Eleven contractors were selected, most with significant amounts of commercial business. A summary of the interviews is included in the Touche Ross & Company report. (Reference Appendix 1)

### Negotiated Profit Data

The DD Form 1499, Report of Individual Contract Profit Plan, is prepared for negotiated contractual actions with cost and profit that together amount to at least \$500,000.

The DD Form 1499 data for years 1977 through 1983 were obtained, analyzed, and where necessary corrected. This data provides information to evaluate contracting officers' implementation of the DoD Weighted Guidelines (WGL) profit policies and procedures. It also provides statistics on profit objectives and overall negotiated results by type of contract and commodity. The Logistics Management Institute (LMI) assisted in the analyses of the DD Form 1499 data; their report is included as Appendix 2.

### Facilities Capital Cost of Money

The Cost Accounting Standards Board prescribed, in Cost Accounting Standard 414, a form entitled "Facilities Capital Cost of Money Factors Computation" (CASB-CMF). Contractors use this form in support of their claims for imputed cost of money. LMI performed analyses of the CASB-CMF forms to identify changes in contractors' investment in facilities during the study period and used published financial data to verify these trends. Their analyses and comments are included as Appendix 2.

### Opinion Survey of the Financial Community

For the Profit '76 study, the Conference Board conducted a survey of the financial community to obtain their perceptions as to the relative financial stability of defense versus commercial contractors. The Conference Board is an independent not-for-profit business research organization. To determine whether financial community perceptions of defense contractors have changed



since Profit '76, the Conference Board performed a similar survey for the DFAIR. Their survey covered banks, insurance companies, investment rating agencies, and venture capital and accounting firms. They interviewed 34 executives from 27 financial institutions. In addition 37 banking executives contributed their opinions and experiences - 27 through completion of a questionnaire and 10 through personal interviews. The Conference Board report is included as Appendix 3.

#### Opinion Survey of Government Personnel

A questionnaire was developed to obtain the opinions of DoD procurement personnel who have the responsibility for implementing DoD policies. The questionnaire included some questions that were used in the Profit '76 survey to assess changes in attitudes and opinions since the Profit '76 survey. Questions were added to evaluate the policy changes that were implemented since 1976. A total of 57 questions were included in the questionnaire in four major categories: Pricing, Financing, Profit, and Investment Incentives.

A sample of 1064 contract negotiators, contracting officers, contract administrators and price analysts were identified to be surveyed based on the following criteria: civilian grade of GS-12 or above or military grade of O-3 or above; eight or more years of procurement experience; and currently involved in negotiated major weapons systems contracts valued at \$2 million or more.

The administration of the survey was conducted by the Defense Manpower Data Center (DMDC). A total of 785 (73.8%) of the questionnaires were returned and are summarized in a report by DMDC to the study group. The DMDC report is included as Appendix 4.

#### Comparative Industry Data - Quarterly Financial Reports

The United States Department of Commerce, Bureau of the Census publishes a Quarterly Financial Report (QFR) containing corporations' income and balance sheet data by type of industry. The reports for Manufacturing, Mining, and Trade Corporations were used to develop commercial data for comparisons with data collected from DoD contractors. A similar approach was taken in the Profit '76 study. The DFAIR, however, refined the durable goods manufacturers' data to eliminate those industry groups that were the least similar to defense contractors (i.e., stone, clay, and glass products; primary metals industries; other durable goods manufacturers). The data for durable goods manufacturers used include: fabricated metal products; machinery except electrical; electrical and electronic equipment; motor vehicles and equipment; aircraft, guided missiles and parts; instruments and related products. The comparative data developed from the QFR data has been incorporated in the body of the applicable sections of this report.

### Comparative Industry Data - Census of Manufacturers

Economic censuses conducted by the Bureau of The Census, U.S. Department of Commerce provide comprehensive statistical profiles of segments of the national economy. This program includes manufacturing, retail trade, whole-sale trade, service industries, mineral industries, and construction industries. The economic censuses are used by the Government in setting economic policy and monitoring economic programs. The data can serve as benchmarks for indexes of industrial production, productivity, and price.

Economic censuses are taken at five year intervals covering only the years ending in "2" and "7". An annual survey of manufacturers (ASM) is conducted during the intervening years on a sample including about 1/5 of all establishments reporting to the economic census. All large manufacturers are included in every sample.

The data were used by the DFAIR for comparison with the capital intensity and productivity of defense contractors.

### Comparative Industry Data - Standard & Poor's Compustat Services, Inc.

The Service consists of a computer-readable library of financial, statistical, and market information covering several thousand industrial and nonindustrial companies. Key data from income statements, balance sheets, and the stock market are included.

The primary industrial file contains data for about 900 companies including the Standard and Poor's 400. The data are adjusted and restated to reflect accounting changes, mergers of companies, and discontinued operations so that the data remain comparable. Data from the Compustat service were compared to data collected from the DFAIR sample of defense contractors.

### Analysis of Individual Contract Data

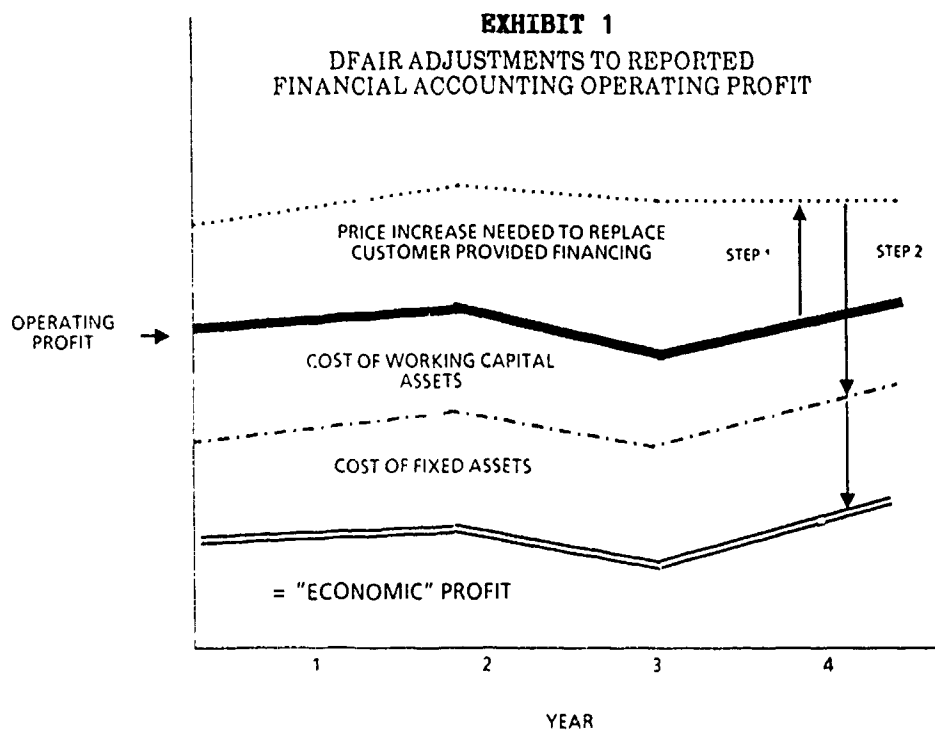
It was also desired to evaluate the effect of DoD financing policies on individual contracts. To accomplish this, six major defense contractors were requested to submit cost and Government payment data for selected contracts. Data were received on 32 cost and fixed-price contracts. The data proved to be extremely useful in determining the cost incurrence profile and duration of the "typical" contract which formed the basis for much of the analysis in Chapter IV, Contract Financing.

### Analytical Problems Associated with Financial Accounting Data

Past studies which attempted to draw comparisons between results from DoD negotiated contracts and industry data such as the Quarterly Financial Reports encountered difficulties. Financial accounting data does not adequately take into account the dramatic difference in customer-provided financing (progress and advance payments) nor does it portray in any meaningful way the economic cost of assets employed. The DFAIR study employs a two step methodology which is intended to overcome both of these weaknesses in financial data comparisons.

- o First, in order to adjust for differences in customer-provided financing, sales revenues and operating income, for both DoD negotiated contracts and the QFR, are increased by the average yearly value of the customer-provided financing times the Short Term Commercial Loan Rate. This calculation basically shows what the revenues and operating income would have been if the customer-provided financing had been provided by private lenders, without having a detrimental impact on before tax earnings. Having made these adjustments, we can now consider all current assets employed to be owned and financed by the contractor or firm.
- o Second, since recorded financial accounting interest expense is not accurately correlated with the cost of contractor capital employed, an imputed value for these assets is calculated by multiplying the average gross value of inventories and accounts receivable by the Short Term Commercial Loan Rate and by multiplying the average net book value of fixed assets by a five year commercial borrowing rate (developed by the Treasury and used for contract disputes). The sum of these imputed capital costs are then deducted from the adjusted operating income to arrive at a before tax "economic" profit.

By making these two adjustments, more meaningful comparisons can be made by taking into account the value of customer-provided financing as well as the full cost of assets employed. These adjustments are portrayed in simplified form in Exhibit 1.



### Federal Income Taxes and Inflation

While the result of the two adjustments shown in the Exhibit 1 is labeled "economic" profit, it excludes two additional important factors which economists include in their definition and calculation of economic profit -- namely inflation and federal income taxes. Inflation adjustments to the DFAIR profit comparisons were not made because the Quarterly Financial Report data were not adjusted for inflation. Federal income taxes were not included in the analysis for two basic reasons:

- o The DoD policies being examined are on a pre-federal income tax basis. While it is undoubtedly true that defense contractors' cash flows have been altered as a result of the application of recent tax law changes, it has long been DoD's policy to maintain a neutral stance on tax laws applicable to the economy as a whole.
- o The accurate tracing and/or allocation of tax benefits to DoD negotiated contracts would have been exceedingly difficult, if not impossible, for the contractors requested to participate in the study, since they do not maintain records on that basis. Had we requested this information, it is likely that the participation rate would have been somewhat lower, and the information provided would have been of questionable validity.

## CHAPTER III

### PRICING PRACTICES AND PROCESS

The Department of Defense policy on purchasing goods and services is to rely on commercial market prices or competition whenever feasible. The department buys a large number of goods and services which are readily available in the commercial marketplace. In FY 83, \$37.8 billion representing 5.5 million contract actions were awarded in this category. DoD is also faced with the problem of purchasing a great number of highly expensive, technologically complex, militarily unique items for which there is no effective market mechanism to set the price and where it is economically impractical to obtain competition. In these instances prices are negotiated with contractors based on an evaluation of projected costs to perform the work plus a markup (profit) based partially on projected costs, partially on capital employed and partially on risk. The markup is calculated using the Weighted Guidelines method described in DFARS 15-905. The DFAIR study focuses on this latter category of items.

Before going into a more detailed discussion of pricing practices, it will be useful to describe some of the salient characteristics of militarily unique items. As compared to "commercial" items, these items tend to be:

- Technologically complex, primarily because the missions they must perform have become increasingly difficult in a high technology threat environment which changes rapidly.
- Expensive, primarily because of the necessary technological complexity.
- Produced in low volume because of their high cost, and the rapidly changing technological environment which tends to accelerate obsolescence.
- Required to be highly reliable and maintainable in order to perform their mission ... hostile environments on short notice, and to minimize repair costs.
- Long in development because of their complexity and because of the "fly-before-buy" funding/acquisition process.
- Produced in a regulated market environment which is subject to drastic swings based on political considerations. Relatively large portions of a company's business can be initiated or curtailed depending on the vagaries of the annual appropriation process.

DoD and industry are faced with a difficult task of balancing the need for stability in design and production, which should lead to lower costs

of weapon systems with the need to insure those weapon systems are capable of countering continually changing threat environments.

It is useful to describe the phases of the weapons acquisition process, in a somewhat simplified form, in order to understand better the DoD pricing process and industry's reaction to it. The process essentially proceeds through five phases. Exhibit 1 summarizes some of the essential features of each phase.

- Concept Exploration. Both DoD and industry devote substantial resources to advance the edge of technology. It is essential from DoD's perspective to be sure we can stay abreast or ahead of potential adversaries. Industry shares this concern but they are also striving to achieve or maintain a competitive advantage over other companies.
- Demonstration/Validation. The decision to begin development of a new weapon system/subsystem starts in this phase. There is generally a mixture of DoD and company resources devoted to the work performed to demonstrate the feasibility of proceeding further into the full-scale engineering development process. During this phase there usually are a number of competitors all striving to win the successive phases of the program. According to the interviews conducted by the study group at 11 companies, this phase is the most critical in their decision to pursue a program. They all expected to have to devote substantial company resources to win, and their decision on whether to compete at all is strongly dependent upon a comparison of their capability and capacity to that of competition. There was unanimous agreement that if they had not completed a substantial amount of work on an item prior to the issuance of the demonstration/validation requirement, it probably was not worth proceeding further. Once the exploratory effort is completed, the decision to compete is based upon the amount of company resources needed to stay in the competition against the probable return if they should ultimately be successful.
- Full-Scale Engineering Development. This phase of the process involves the development of detailed specifications for entering into the production phase. It generally includes prototype production and testing to insure that production items will perform in the manner desired. Depending upon the system/subsystem, there may or may not be competition in this phase. If the cost of full-scale development is relatively large and planned production requirements relatively small, it has been DoD's practice to restrict this phase of the program to one contractor. In selected cases where it appears to be economically beneficial to continue competition, and development funds can be provided, then there may be two contractors competing through this phase. In recent years, DoD has increased the use of dual production sources in order to gain the benefits of competition. The industry executives interviewed expressed concern over this trend. They are all in favor of competition but cautioned against the pursuit of competition for its own sake when it is economically unsound. Some contend that, in spite of sole source production of some systems,

competitive pressures exist between systems. DoD is in a position, for example, to order more or fewer F-15 aircraft depending upon the costs of F-16 aircraft. They therefore argue that both F-15 and F-16 manufacturers have a great deal of incentive to keep their costs and prices under control. Perhaps more importantly, they argue that planned dual sourcing changes the risk/return equation for industry. Since the return for the "investment" made in the early phases of the process occurs during the production and later phases of the process, any return reduction caused by dual sourcing restricts willingness to make the investment in the first place.

- Production. The production phase ideally begins when full-scale development is complete and testing has demonstrated that the system/subsystem will perform as required. In recent years, there has been less prime contractor competition during this phase of the process for major weapon systems. The cost required to duplicate the development and capital investment necessary to produce the items, along with limited planned production runs, has meant that production dual sourcing is not always economically sound. The exceptions to this general rule are for mobilization base requirements, or when there are sufficiently long, high annual rate production runs to economically justify more than one producer.
- Deployment. This phase generally begins during the production phase and extends well beyond the completion of production. At the beginning of this phase, DoD looks to the system/subsystem developer to provide initial support, but strives to develop second sources for repair and spare parts quickly and to the maximum extent possible, consistent with maintaining the weapon system support integrity. Therefore, the level of competition in this phase can be higher than in production.

**EXHIBIT 1**  
**MAJOR WEAPON SYSTEM**  
**ACQUISITION PROCESS**

	FULL SCALE	
CONCEPT	ADVANCED	ENGINEERING
EXPLORATION	DEVELOPMENT	DEVELOPMENT
	PRODUCTION	DEPLOYMENT

**TECHNICAL & COST**

UNCERTAINTY	VERY LARGE	LARGE/MEDIUM	MEDIUM/SMALL	SMALL
CONTRACT TYPE	NONE	COST TYPE	CPFF/CPIF/FPIF	FPIF/FFP
TIME	CONTINUING	1-2 YEARS	2-5 YEARS	3-15 YEARS
RELATIVE COST	SMALL	SMALL	MEDIUM	LARGE
NUMBER OF COMPETITORS	MANY	2-5	1-2	1
COMPETITION	YES	YES	MAYBE	SOMETIMES
				YES

UP TO 25 YEARS

1+



It is also worth reviewing, in general, the goals of private business and the financial methods they use to achieve those goals:

- The primary goal for most companies is to use investors' resources to provide products and services to markets which will provide an adequate and relatively stable return commensurate with risk. The returns to investors must, over the long run, be higher than "risk free" returns available through investing in government securities. This is so because there are varying degrees of uncertainty, and therefore risk, of realizing those returns in continually changing marketplaces. All of the interviews at the 11 corporations indicated that return on equity is a primary factor in setting long-term strategic goals and short-term operating targets, with most indicating that their goal was to realize return on equity after taxes in the 15-20% range.
- Company management has choices in how it employs investors' resources. It must decide the mix and timing of purchasing materials and labor and of investing in capital facilities to develop and produce items to sell at prices sufficiently in excess of costs to provide the desired return. Each of these three factors of production also carries different degrees of risk, with purchased products probably having the least risk and capital facilities the most.
- Since all markets entail some degree of uncertainty, some projects will provide less than the average return required and may even result in a loss. Therefore, other projects must provide higher than average returns in order to achieve the company's long-term goals. Management must continually reassess its markets and redeploy its resources towards those projects with the highest expected value.
- Since many markets are cyclical and most products go through a natural life cycle, management seeks to reduce overall risk through diversification, either by participating in many markets whose cycles run in different phases or by having many products which are in different phases of their life cycle.
- In order to survive and prosper over the long term, some investment must be made in developing new products or services which will be demanded by the marketplace. All of the 11 companies where interviews were conducted devoted substantial resources to company-sponsored research and development which, from an accounting point of view, is expensed against current earnings. From a management point of view, it is considered to be an essential investment in products which will come into existence 5-10 years into the future.
- Management can also employ financial leverage and operating leverage to achieve long-term earnings goals, although both of these methods can increase earnings risk.

- Financial leverage is achieved by acquiring debt to increase the resources available to employ on worthwhile projects. In theory, if a company has project opportunities which are expected to yield a return greater than the after-tax cost of borrowing, then management can increase the return on equity by borrowing money to finance those projects. Of course, if the projects earn less than the after tax cost of borrowing, return on equity will be decreased. The degree of financial leverage is typically measured by the debt/equity ratio or the debt/total capital (debt plus equity) ratio. The higher the ratio is, the more leverage and risk. All of the 11 firms had some degree of financial leverage with debt/total capital ratios ranging from 25 to 50%. Management at all of the companies felt fairly comfortable with their debt/total capital ratios given the markets they are participating in, although management at the company which had 50% debt is hoping to lower it to the 35-40% range in the near to mid-term.
- Operating leverage is achieved by increasing the intensity of use of the resources (assets) employed in the business. Typical measures are sales/assets and sales/total capital ratios, also called asset turnover or capital turnover. Obviously, the greater the level of sales a company can generate with a given amount of resources, the less earnings per sales dollar is required in order to achieve a desired return on equity objective. Conversely, if earnings per sales dollar is fixed and sales per assets decline, then return on equity will also decline.
- The existence of leverage can permit the achievement of a return on equity or return on capital goal with a smaller return on sales than would be required in the absence of leverage. Exhibit 2 demonstrates this phenomenon.

**EXHIBIT 2**  
**SELECTED 1983 FINANCIAL RESULTS**

	<u>GROCERY STORES SUPERMARKETS</u>	<u>AEROSPACE/ DIVERSIFIED</u>	<u>DRUG INDUSTRY</u>	<u>ELECTRIC UTILITIES</u>
Net Profit Margin (After Tax % of Sales)	1.21%	3.8%	11.5%	13.3%
Sales/Equity (Operating & Financial Leverage)	11.7	3.8	1.7	1.02
Return on Equity	14.2%	14.5%	19.7%	13.5%

Source: Value Line

From Exhibit 2, it is clear that the "economics" of various industries and markets are substantially different. By the same token, each firm that chooses to participate in those markets or industries must be able to adapt and operate in accordance with the economic imperatives of those markets, if it is to survive and prosper over the long term and continue to meet the expectations of its investors.

In addition there are many different types of markets which carry with them different pricing policies and practices. Many of the DFAIR participating contractors are involved in different markets and have some choice and capacity to redeploy resources from one to others. Some general theoretical examples, for illustrative purposes, are:

- Pure Competition. A market situation where there are many producers and many buyers. In this type of market the interaction between the buyers and producers is very effective in setting prices based on value received in the transaction. To be successful in this type of market producers must, over the long run, be able to deliver items demanded by the market at costs below the prices available. There is very strong motivation for producers to reduce costs.
- Oligopoly. A market situation where there are a few large producers and many buyers. One firm generally performs as leader in setting prices, which are then matched by the other firms. There is still a strong motivation for producers to keep costs tightly under control.
- Monopoly. A market situation where there is one producer and many buyers. Since the producer is free to charge whatever the market will bear, there is limited motivation to set prices based upon a fair return on the cost of the factors of production. For this reason, monopolies in this country (e.g., public utilities) are generally regulated.
- Monopsony. A market situation where there is one buyer and several producers. This is the type of market which characterizes the majority of dollar purchases of the Department of Defense. In this situation the buyer has great leverage in setting the prices and other terms and conditions of purchase transactions, because "it's the only game in town." On the other hand, if the buyer wants to assure the continued existence of several producers for the sake of future competition, the buyer must behave in a manner which will provide adequate returns to the producers.

Of course, in the real world, there are very few "pure" markets meeting the above descriptions, and to the extent they do exist, they tend to change over time. Many companies, under the protection of patent and copyright laws, are continually striving to reap large rewards. The very existence of those potential large rewards is the motivating force which induces large investment in research and development. The pharmaceutical industry and consumer electronics industry are replete with examples where individual product operating margins are extremely high. In addition, many of the 11 corporations interviewed were in other markets which had the potential for very large

returns. One of the interviewed companies cited, as an example, their development of synthetic industrial diamonds which, in competition with natural industrial diamonds, is able to achieve an operating margin of 90%.

DoD's pricing policies for militarily unique items do not permit operating margins of this magnitude. This fact is often cited by industry as one of the fundamental reasons that they are unwilling and unable to invest the substantial sums required to develop a product to offer for sale to the DoD on an "off-the-shelf" basis. Under these policies, DoD contracting officers, auditors and other technical advisors are required to examine proposed costs to insure they are allowable under cost allowability rules and are reasonably necessary for contract performance. In most instances, DoD negotiators are required to use the Weighted Guidelines in developing a prenegotiation markup (profit) objective which is based partly on the allowable costs of performance, partly on the facilities and equipment capital investment required to perform the contract, and partly on the risk associated with the type of contract. In addition, financing through progress payments is provided on large, long-term fixed-price contracts if requested by the contractor. Financing is also provided on cost-type contracts by reimbursing 100% of incurred allowable costs on a regular basis during contract performance.

#### **Overhead and G&A Expense**

A substantial portion of the allowable costs used in pricing DoD contracts consists of overhead and general and administrative (G&A) expense. Over the years there have been continuing concerns expressed about controlling and decreasing contractor overhead and general and administrative expense. This has been and continues to be an intractable problem because, by their very nature, these costs are not directly assigned to particular production activities of the firm. They are costs associated with supporting the production activities, performing the general day-to-day management of the business, and supporting those activities necessary to obtain new business. Furthermore, they are "managed" costs - everyone can agree these expenses are necessary for the long-term successful operation of the firm, but the question is how much of each of these costs is necessary for efficient operations. For example, corporate managers can reduce Research and Development expenses and thereby "save" money in the short term, but if they are reduced too much, future opportunities may be foreclosed and the value of the firm may be diminished.

Unfortunately, most accounting and control systems in use by companies today do not provide the information which is required for effective and efficient management of these costs. In the May-June 1984 Harvard Business Review, Robert S. Kaplan points out: (5)

Many U.S. companies are now exploiting new process technologies, new inventory and materials handling systems, new computer based abilities in design engineering and production, and new approaches to work

force management. But these developments, promising as they are, rest on a foundation that is obsolete and in need of repair ... most accounting and control systems have major problems: they distort product costs; they do not produce key non-financial data required for effective and efficient operations; and the data they do produce reflect external reporting requirements far more than they do the reality of the new manufacturing environment.

He goes on to state:

... that poorly designed or outdated accounting and control systems can distort the realities of manufacturing performance. Equally important, such systems can place out of reach most of the benefits of CIM (computer-integrated manufacturing) processes. As information workers like design engineers and systems analysts replace traditional blue collar workers in factories, accounting conventions that allocate overhead to direct labor hours will be at best irrelevant and more likely counterproductive to a company's manufacturing operations. And with the new manufacturing technology now available, variable costs will disappear except for purchases of materials and the energy required to operate equipment.

Not only will labor costs be mostly fixed, many of them will become sunk costs. The investment in software to operate and maintain computer-based manufacturing equipment must take place before any production starts, and of course that investment will be independent of the number of items produced using the software program. With the decreasing importance of variable labor costs, companies that allocate the fixed, sunk costs of equipment and information systems according to anticipated production volumes will distort the underlying economics of the new manufacturing environment.

In this environment, companies will need to concentrate on obtaining maximum effectiveness from their equipment and from their increasing investment in information workers and in what they produce. Controlling variable labor costs will become a lower priority. This major change in emphasis requires that managers learn new ways to think about and measure both product costs and product profitability.

Clearly, this issue will become crucial to DoD as contractors invest in more and more automation. The underlying basis for pricing militarily unique items is to pay for the fair and equitable costs of production plus a fair

markup after taking financing arrangements into consideration. If the current accounting and control systems are inadequate for company management, they are also inadequate to be used as a basis for accurately pricing contracts.

A somewhat simple example will be useful to demonstrate the basic DoD pricing process and the consequent financial results for the contractor.

Let's assume the contractor and the DoD have negotiated a fixed-price contract for the delivery of an item worth \$113.35 thousand three years from now using current DoD policies and the following cost and markup information:

	(DOLLARS IN THOUSANDS)			
	<u>ALLOWABLE COSTS</u>	<u>MARKUP FACTOR</u>	<u>MARKUP DOLLARS</u>	<u>PRICE</u>
Prime Product Costs				
Direct Effort	\$ 15	.09	\$ 1.35	\$ 16.35
Overhead	35	.06	2.1	37.1
Material	40	.02	.8	40.8
Subtotal	<u>\$ 90</u>		<u>\$ 4.25</u>	<u>\$ 94.25</u>
General & Admin.	8.8	.05	.45	9.25
Total Cost	98.8	RISK @ .069	6.85	6.85
Facilities Employed	1.2		1.8	3.0
Total	<u>\$100.0</u>		<u>\$13.35</u>	<u>\$113.35</u>

The facilities employed numbers were derived as follows:

FACILITIES EMPLOYED = \$10.0  
 IMPUTED COST @ .12 = \$ 1.2  
 MARKUP @ .18 = \$ 1.8

While DoD treats the imputed-cost of facilities capital as an allowable cost, the contractor cannot treat it as a cost in his financial accounting system (instead, his financial accounting system will include the actual facilities capital interest expense as a cost) and he will view this \$1.2 as an addition to markup. At this point, he would view the negotiated price being broken down as follows:

	<u>ALLOWABLE COSTS</u>	<u>MARKUP</u>	<u>PRICE</u>
Financial Accounting	\$98.8	\$13.35	\$112.15
Facilities Employed	<u>1.2</u>	<u>1.2</u>	<u>1.2</u>
	<u>\$98.8</u>	<u>\$14.55</u>	<u>\$113.35</u>

In addition, the contractor must recover the costs which are unallowable under DoD regulations from the markup part of the price. There are currently 39 cost principles which totally or partially disallow those costs which are not deemed

necessary to obtain or perform contracts for DoD. Examples of these unallowable costs are: advertising, Independent Research and Development and Bid and Proposal Costs (IR&D/B&P) in excess of negotiated ceilings, interest costs, and lobbying costs. The firms which submitted data for use in financial analysis had unallowable costs, other than interest, in the 1.5-2.0% range with the largest category being over-ceiling IR&D/B&P.

Continuing our simple example and using 2% as an unallowable cost figure, using an imputed interest cost for inventory, and recognizing an imputed interest cost for facilities employed, the negotiated price is as follows:

	<u>COSTS</u>	<u>MARKUP</u>	<u>PRICE</u>	<u>MARGIN</u>
Total Allowable Costs	\$ 98.8	\$14.55	\$113.35	12.8%
Unallowable Costs (Except Interest)	<u>2.0</u>	<u>(2.0)</u>	<u>--</u>	
Total Operating Costs	\$100.8	\$12.55	\$113.35	11.0%
Imputed Inventory Financing	2.0	(2.0)		
Imputed Facilities Capital Financing	<u>1.2</u>	<u>(1.2)</u>		
Total Costs	\$104.0	\$ 9.35	\$113.35	8.2%

The imputed inventory financing was derived as follows:

#### AVERAGE WORK-IN-PROCESS INVENTORY

	<u>AVERAGE COSTS FINANCED</u>	<u>AVERAGE TIME FINANCED</u>	<u>IMPUTED INTEREST RATE</u>
Allowable Costs	\$98.8	3 years from	Short term
Less 90% P.P.	<u>88.9</u>	start to	commercial
	\$ 9.9	delivery divided by 2	loan rate
Unallowable Costs	<u>2</u>		
	\$11.9	x 1.5 years	x 11.0% = \$2.0

In this example, 90% progress payments were assumed to be the financing provided by DoD. It should be noted that for every 10% decrease in progress payments provided by DoD (e.g., from 90 - 80%), the imputed interest cost for work-in-process inventory in this example would increase by approximately \$1.6 ( $9.9 \times 1.5 \times 11\%$ ) and the margin on total costs will decrease 1.5%.

Thus, while the DoD contracting officer would have reported a negotiated markup of 14.7% on cost (14.55 divided by 98.8), the contractor, based on negotiated costs, expects the realized markup to be 9.0% on cost (9.35 divided by 104.0) and the before tax margin to be 8.2% after all the unallowable costs and imputed financing costs of work in process inventory and capital employed are covered.

The realized profit outcome is more appropriately termed an "economic profit" outcome. The interest amounts imputed for inventory financing and for facilities capital financing may not represent actual costs incurred by the contractor if equity rather than debt is used to finance these items. When equity financing is used, the associated cost is an opportunity cost which represents the amount that could be earned if the assets were invested in short and intermediate-term marketable securities.

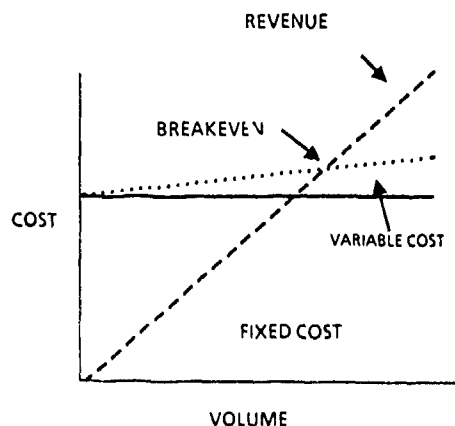
However, the actual outcome can be substantially different than originally expected for a number of reasons.

- Technical Uncertainty. Technical uncertainty varies from very large in the earlier phases of the acquisition process to small in production. This causes the predictability of costs to be uncertain. It is understandable that contractors desire to minimize their risk (defined as the cost consequences of technical uncertainty) as much as possible. Because it is in DoD's long-term best interests to have more than one producer for the products it requires, cost risk is generally shared with contractors through the use of cost-plus-fixed-fee or incentive-type contracts. Critics contend these types of contracts provide lessened motivation for a contractor to control costs and advocate more use of firm-fixed-price contracts to provide maximum cost control motivation. However, while firm-fixed-price contracts may provide greater cost control motivation, they do not provide a solution to technical uncertainty and its cost consequences. Past attempts by DoD to use fixed-price contracts early in the acquisition process have met with limited success. This is especially true when DoD has attempted to gain fixed-price commitments, under competition, for both the full-scale engineering development and production phases of a program, as was done on the total package procurement of the C-5A in the late 1960's. Also, many of the problems associated with shipbuilding losses and claims in the 1970s can be traced to use of fixed-price contracts too early in the acquisition cycle. DoD seemed to learn from this experience and re-emphasized the need more appropriately to match the contract type with the degree of technical uncertainty and cost risk (For example, Initiative Number 8 of the 1981 Acquisition Improvement Program was aimed precisely at this point). The management personnel interviewed by DFAIR at 11 corporations, however, reported seeing more and more competitive solicitations from all the services for full-scale engineering and early production work which call for fixed-price contracts. While many would agree that in some selected cases this approach may be appropriate, they were also very concerned that the military services would attempt to expand the use to inappropriate situations.
- Business Risk. In addition to the cost risk associated with technical uncertainty, other factors introduce risk into operating a business. These, in general, are associated with market conditions, their effect on overall business volume, and their effect on the costs and margins



of production of captured business. All markets are uncertain, both in terms of total demand and in terms of the allocation of that demand among producers. All companies must respond to their markets, and make day-to-day decisions that effect both their short-term success and their longer-term survival. Most companies want to maintain or improve their short-term positions in markets where they are competitive, and to focus the use of their resources to gain a longer-term advantage through new or improved product introductions or through more efficient production of existing products. The greater the degree of market instability, the greater the business risk and the greater the need for flexibility to adapt. One way to achieve this flexibility is to minimize product-specific capital investment and rely on the ability to hire or lay off people as demand changes. Of course, this approach doesn't always lend itself to achieving the necessary efficiencies to become and remain competitive, especially where products are competing against those of foreign nations with a distinct labor cost advantage. The following graphs illustrate two substantially different approaches to production.

**EXHIBIT 3**  
CAPITAL INTENSIVE



**EXHIBIT 4**  
LABOR INTENSIVE

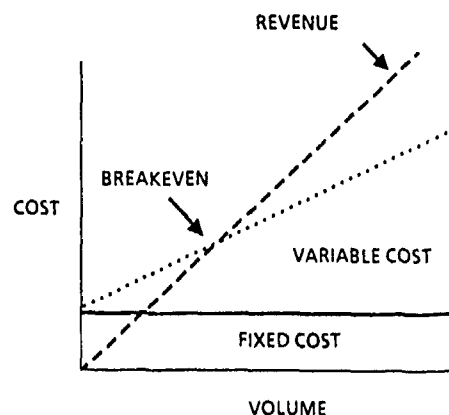


Exhibit 3 is a "capital intensive" example which carries with it high "fixed costs" and low "variable costs" while Exhibit 4 is just the opposite. The variable costs per unit in the labor intensive example are four times as great as in the capital intensive example, fixed costs are only one-fourth as great and the breakeven volume is approximately one-half. However, the marginal profit/loss per unit is substantially higher in the capital intensive example. Markets which have relatively certain, high-volume demand will

encourage relatively more capital intensive production precisely because of the higher marginal profit potential. Uncertain and/or low volume markets encourage just the opposite.

Sales volume is not the only item of uncertainty to contend with. Costs themselves have become increasingly more uncertain in the past 10-15 years. The rate of inflation in 1973-1981 was exceptionally high and has moderated substantially in the last few years. To the extent that effects of inflation on the costs of production are unpredictable, profit projections will be unreliable. Many forecasters tend to project past experience into the future. If actual inflation is lower than predicted, then profits at a given volume will be higher than expected and vice versa. Inflation risk can be very great in pricing long-term contracts. In the mid-1970's many contractors experienced losses on contracts because they had underestimated the impact of inflation. The use of economic price adjustment (EPA) provisions increased substantially in both commercial and defense long-term contracts. In the early 1980's, with inflation declining, the use of EPA provisions in defense contracts also declined. It therefore is to be expected that some contracts, which were priced on the basis of inflation predictions which were higher than inflation which actually occurred, achieved a higher level of profit than originally expected.

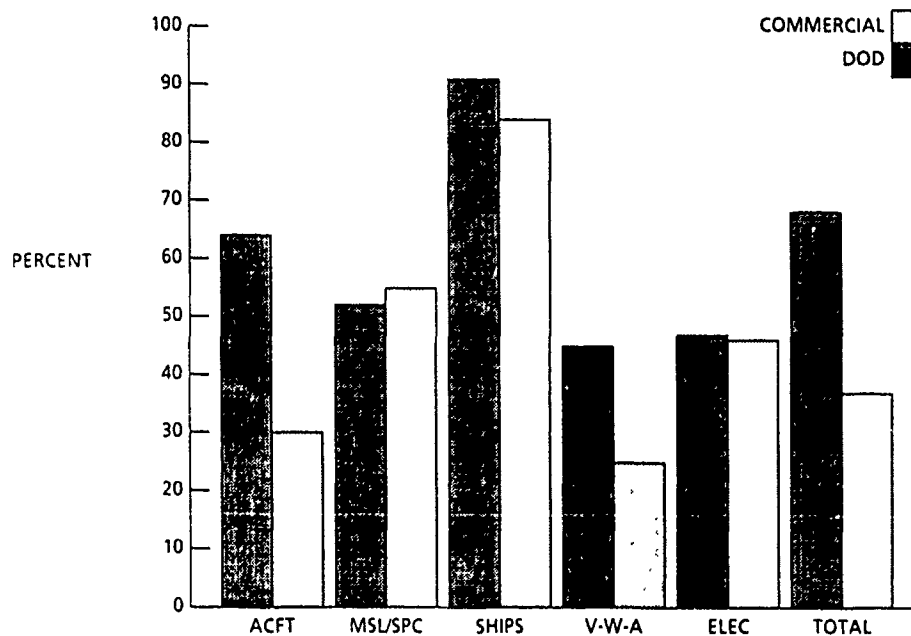
Volume and inflation risk are particularly acute in the defense market. All of the management personnel interviewed at the 11 companies indicated that there were substantial differences between their defense markets and their commercial markets. Some companies viewed their defense business as being somewhat more certain than commercial business. They had funded backlogs for one or more years and knowledge that their programs were projected to continue in the Five Year Defense Plan (FYDP). However, they also knew those projections were subject to the vicissitudes of the annual federal budget cycle and subject to being accelerated, stretched out, or even canceled. (For example, during the FY 84 budget process the Senate Appropriations Committee changed 63% of the 1129 line items of the defense budget reviewed and the House Appropriations Committee changed 68%.) (6) Many of the defense programs represent significant portions of a company's business and a severe change of planned production or outright cancellation can cause major problems in managing the business, let alone in achieving good production efficiencies. While commercial market demand can also change and funded backlog tends to be shorter in those markets, most of the companies felt they were more in charge of their destiny in the commercial markets than in defense, and less subject to boom or bust cycles. Since defense contracts tend to be longer-term than commercial contracts, the impact of not accurately forecasting inflation is also much greater. Most contractors felt they could bear the risk for short-term contracts (two years or less) but would recommend the use of EPA clauses on longer-term contracts (three years or more) to avoid the necessity to cover the inflation risk with higher pricing factors.

In general, commercial items are produced in high volume, financed by the producer, and sold at a price dictated by the marketplace, while defense items are low volume, financed by the customer at a price negotiated based on

projected costs. There are, however, a number of commercial products which are very similar in nature to defense items. Commercial pricing practices for these items are different than for other commercial items, and in some respects are similar to pricing practices used by DoD. Examples include commercial airplanes, commercial aircraft engines, and commercial communications satellites. These items, like many DoD items, are technically complex, very expensive and produced in relatively low volume. The companies who produce and sell these items also require some customer financing through an initial advance payment prior to starting production and periodic payments as production progresses with a final payment at delivery. Financial data collected from 76 firms indicate that commercial financing through customer progress payments and advances varies among product groups and in some cases meets or exceeds the level of financing provided under DoD policies. Exhibit 5 shows the portion of accounts receivable and inventories which were financed by DoD and commercial customers for aircraft and engines; missiles and space; ships; vehicles, weapons, and ammunition; and electronics.

### EXHIBIT 5

#### PROGRESS PAYMENTS/TOTAL CURRENT ASSETS 1977 - 1983 AVERAGE



Source: Touche Ross

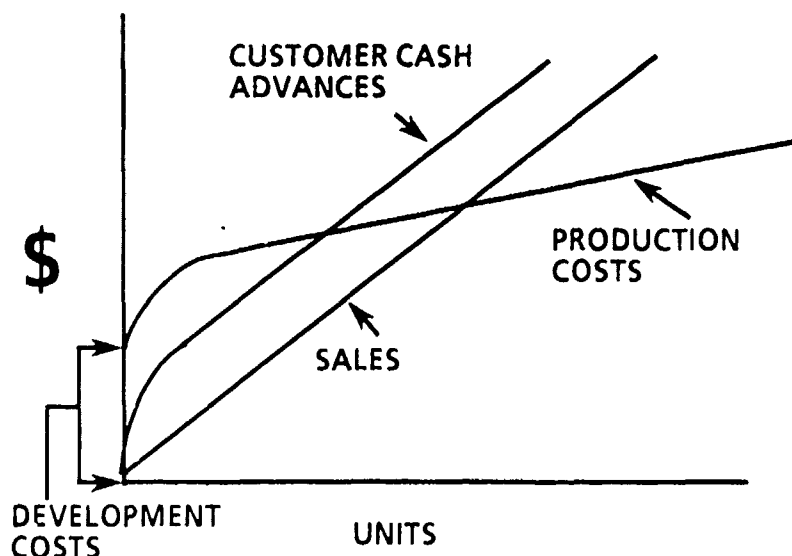
## Purchases of Airplanes

While there are similarities in the pricing and financing of complex, expensive and low volume items produced for the commercial and defense markets, there are also substantial differences. A simple comparison of the economics of commercial airplane development, production and sales with those of the defense market illustrates these differences.

Airplane development, test and preproduction costs run into hundreds of millions to billions of dollars. Prior to undertaking an investment of this magnitude, companies producing commercial aircraft first want to assure themselves there will be a market which will demand a sufficient quantity of the airplanes at a price adequate to cover the costs of production and yield a profit sufficient to provide an adequate return on the investment.

Most companies will "average" price these items over the expected production volume (subject to economic price adjustment provisions) so all their customers receive the products on essentially the same price basis, regardless of costs of production. Production costs tend to be high early and decline rapidly as experience is gained. Exhibit 6 depicts, in simplified form, an airplane manufacturer's financial expectations when the decision is made to develop and produce a new model.

EXHIBIT 6  
COMMERCIAL PURCHASE OF AIRPLANES

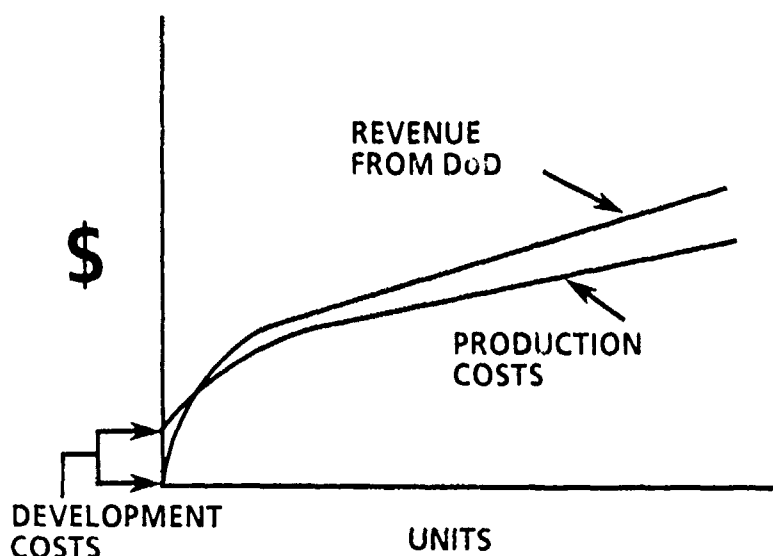


The effects of production learning can be seen in the bend in the production cost curve. Customer advances can also be seen to precede the actual sale. In addition there are two distinct "breakeven" points, one for cash flow and the other where sales revenue is equal to total costs. The existence of these financing terms permits the aircraft manufacturer to

minimize financial risk and provide lower prices than if financing had not been provided. It is also apparent that once production is beyond the cash flow breakeven point, further production and sales generate very substantial amounts of revenue and cash. The potential "rewards" beyond the breakeven point are the justification for undertaking the risk associated with a very large investment.

DoD's practices in purchasing airplanes are somewhat different and are depicted in Exhibit 7.

#### EXHIBIT 7 DoD PURCHASE OF AIRPLANES



Contractor development costs are much smaller since DoD contracts for much of the development. In addition DoD prices production contracts on the basis of projected costs, so that the prices of earlier deliveries are substantially above "average" but decline at the same rate the production costs decline. A comparison of this graph with the commercial airplane example shows substantially less contractor investment in the DoD program, and substantially less opportunity for return than is available in the commercial program once beyond the breakeven point. The limited opportunity for return also explains why contractors are unwilling to undertake substantial development and preproduction investments in military aircraft.

#### Contractor Responses to DoD Acquisition Policies

Given the above conditions, what can a prime contractor do to improve his chances for obtaining defense business in the first place, make adequate returns over the long run, and maintain the appropriate flexibility to respond to defense market instability?

- Obtaining Business. Early in the acquisition process contractors are faced with the need to demonstrate the worth of their products for

future production and deployment and they are also generally faced with competition. The need to sell their programs causes them to be somewhat optimistic in cost projections and to be willing, to some degree, to share in the development costs with the Government.

- Making Adequate Returns. Once a program is approved and the competition is over, the best way to improve the returns is to become somewhat pessimistic on the projected costs during contract negotiations and then, once the contract is negotiated, perform better than those pessimistic projections. Of course there are limits to the

degree this strategy can be pursued. If the cost projections are too pessimistic, especially in comparison with the earlier optimistic projections, the contractor's credibility and reputation suffer. In addition, if the program cost projections are too high, the customer may scale back the production rate, look for other more affordable alternatives, or curtail the production run earlier than expected. On the other hand, many have pointed out that underrunning contracts is also somewhat self-defeating. If the underrun is too great, the contractor's credibility is damaged and, perhaps more importantly, the customer will take the underrun into account in future contract negotiations. Since contract markups are largely based on projected costs, a large underrun could substantially diminish returns on future contracts.

- Maintaining Flexibility to Adapt to Market Instability. One of the principal means is to minimize investment in program-specific capital items and rely on acquiring or laying off labor to adapt to changes in production. Most companies, however, also want to minimize changes in the labor force and desire to be a stable employer over the long term. These companies tend to use subcontracts extensively. On production contracts during 1977-1983, material and subcontract costs were between 40 and 45% of total allowable cost.\* By subcontracting substantial portions of the work, prime contractors maintain more flexibility to adapt to changing conditions and spread the risk of market instability to others.

Over the years, DoD and the military services have taken a number of steps to address the deficiencies in the acquisition process. The 1981 Acquisition Improvement Program is perhaps the most comprehensive approach to improve the ability to acquire weapon systems in a more cost effective and efficient manner. Some of the main elements are:

- Improved Cost Estimating. A great deal of effort has been devoted to improving DoD's ability to make independent cost estimates in order to better detect the degree of optimism or pessimism in contractor cost projections. Independent Cost Analyses (ICAs) are required at each

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\*Source: DD Forms 1499

key milestone decision in a program's life, and to a great extent these projections form the basis for budget requests. "Should Cost" is a technique which is used to counter pessimistic contractor cost estimates for sole source production contracts and to assist in attaining lower negotiated prices.

- Improved Program Stability. The Acquisition Improvement Program contained a number of items directed at improving program stability. Planning for economic production rates and the use of multiyear contracts would allow contractors to improve their production processes, acquire subcontracted items at a lower price through the use of economic order quantities, provide lower overall prices to DoD and earn an equitable return. Since technical change is a major item which causes business and program instability, steps were taken to manage this process better. The Acquisition Improvement Program required selected major programs to address this issue explicitly through the use of Preplanned Product Improvement in order to minimize the cost of incorporating future technical improvements in emerging weapon systems.

This chapter has described the pricing practices and policies followed by DoD in negotiating contracts for weapon systems and subsystems and has compared and contrasted those practices with those of commercial markets. It provides a frame of reference against which to judge the results of the study described in the following chapters. Before proceeding, however, it is worth noting that the underlying cause for many of the differences in those pricing practices is that DoD is using taxpayer dollars to acquire the products required to defend the nation. Over the years, there have been many perceived or actual abuses of the use of public funds, which have led to legislation and regulation intended to correct the conditions which permitted the problem to arise. The cumulative effect of these well-intentioned laws and regulations is an acquisition process which is very much more complex than exists in the commercial marketplace and one which, in many respects, is more expensive and less efficient. Complaints about red tape and the extensive supporting paperwork associated with government procurement are legion. All of the management personnel interviewed at the 11 companies commented on the very substantial costs associated with complying with government documentation and oversight requirements. They expressed the hope that the process of ever-increasing legislation and regulation written to correct the abuses of a few could be reversed before it completely strangles the system. They all recognized the need for a set of fair and equitable rules governing the expenditure of public funds but were quite pessimistic about the achievement of an improved, more efficient acquisition process in the current environment which is viewed as becoming increasingly hostile.

## CHAPTER IV

### CONTRACT FINANCING

This chapter examines the Department of Defense's (DoD's) policies on contract financing. The DFAIR project principally focused on progress payments based on costs, as this method accounts for most contract financing furnished by DoD to defense contractors. Other forms of contract financing, such as advance payments, guaranteed loans, unusual progress payments, were not reviewed because they are not customary. They may only be granted by a senior official from the Comptroller function of the applicable Military Department/Agency on the basis of a contractor's demonstrated financial need. In addition, the more specialized contract financing policies, such as unique progress payment rates for small business concerns or Foreign Military Sales (FMS) contracts, were evaluated only within the context of the general policy on progress payments. For shipbuilding contracts, whose progress payments are made on a percentage of completion basis, contract financing has been discussed as a separate topic in Chapter VIII.

### CURRENT POLICY

Although in principle defense contractors are expected to finance their contracts from private sources, contracting officers may grant progress payments as a source of financing working capital under the following conditions:

1. The contract or group of contracts exceed \$1 million (\$100,000 for small business concerns).
2. There is a substantial period of time between when the work begins on a contract and when the product deliveries commence. A substantial period of time is typically regarded as being at least six months (four months for small business concerns).
3. The contractor's expenditures during the pre-delivery period will have a significant impact on working capital requirements.

If the above conditions are expected to be met, the contracting officer may include the Notice of Progress Payments in invitations for bids and requests for proposals. Progress payments may, however, be restricted to small business concerns by using the Notice of Availability of Progress Payments Exclusively for Small Business Concerns if it has been determined that (1) both large and small businesses would respond to the solicitation and (2) only small businesses would need progress payments. The Progress Payments Not Included notice is used if no progress payments will be provided by the Government. Progress payments are ultimately incorporated into DoD contracts via the Progress Payments clause or, if appropriate, the Flexible Progress Payments clause.

It is assumed that an offeror's bid price includes adequate consideration for customary progress payments. Financing arrangements above and beyond that provided under customary progress payments are deemed to be unusual and require separate consideration from the offeror. A prospective contractor's need for



progress payments is not to be regarded by the contracting officer as a handicap for contract award. This policy was established to insure open and fair competition.

Currently, the customary progress payment rate for large business is 80% (higher customary rates are allowed for small business concerns and FMS contracts). This rate is applied to the contractor's incurred costs, but in some cases such as costs of purchases made directly for the contract (e.g., direct material) and pension fund expenses, its application is limited to actual cash disbursements made by the contractor. Progress payments are allowed monthly, up to an aggregate amount which may not exceed 80% of the contract price. Other limitations are imposed under the Progress Payments clause in order to insure that contract financing payments do not exceed the value of undelivered products contained in the contractor's inventory.

In 1981, DoD created a flexible progress payment methodology which may be used by the contractor in lieu of the customary rate. This approach allows a contractor that progress payment rate (up to 100%) which would limit the contractor's working capital investment to 15% of the average work-in-process inventory. The flexible progress payment rate is established through the DoD's cash flow computer model called "CASHII". This model is available to contracting officers through a central time-sharing computer network. The cash flow data, furnished by the contractor for determining the flexible progress payment rate, are audited by the Defense Contract Audit Agency (DCAA).

#### BACKGROUND

The need for uniform policies on contract financing was proclaimed by the Deputy Secretary of Defense on October 14, 1950. (7) Up to that time, the Military Departments had been free to grant progress payments as considered traditional for the goods and services being acquired. The Military Departments' application of contract financing proved to be uneven, sometimes resulting in overpayments to defense contractors. During this period, DoD was transitioning from wartime acquisition policies and procedures to the more businesslike approach that would be required in the post-World War II era. The initial Joint Regulation on contract financing was published on March 17, 1952. (8)

More specific guidance on progress payments soon became necessary, particularly as DoD began relying more on fixed-price contracts than cost-type contracts. In a memorandum to the Service Secretaries on February 12, 1954, the Secretary of Defense stated that use of progress payments was proper on contracts involving large pre-delivery expenditures in relation to contract price and working capital. The Secretary, however, also set the following limits: (9)

It should be seldom necessary for progress payments based on costs to exceed 90 percent of direct labor and material costs, or 75 percent of total costs, of the work done under the undelivered portion of the contract. Lesser percentages and bases may often be adequate.

The Secretary's direction was subsequently issued on April 22, 1954, as DoD Directive 7840.1, "Defense Supply Contract Financing - Progress Payments Based on Costs." This directive also introduced the concept of customary and unusual progress payments. On December 17, 1956, the Joint Regulation on contract financing was amended to incorporate DoD Directive 7840.1 verbatim as Appendix 5, and it served as DoD's basic policy statement throughout the remainder of the 1950's. In 1959, the Joint Regulation was absorbed into the Armed Services Procurement Regulation as Appendix E. Simultaneously, the progress payment rate limitations for large businesses were lowered to 85% of direct labor and material costs and 70% of total costs. According to a Defense Industry Advisory Council (DIAC) Working Group paper, this action was taken because defense expenditures were higher than expected and posed a conflict with the national debt ceiling at that time. Small business concerns were allowed to continue receiving progress payments at the higher rates. This marked the point at which small business concerns began receiving progress payments at a higher rate than for large business. It coincided with legislative action under Public Law 85-100 in 1958 to "improve opportunities for small business concerns to obtain a fair proportion of Government purchases."

Several changes were made to the progress payment policies in 1968. First, effective March 1, 1968, the customary progress rates were increased from 70% to 80% for large businesses and from 75% to 85% for small business concerns. This action was taken as a result of a DIAC study completed in 1967. DIAC observed that interest had become the largest item of unallowable costs and, therefore, had degraded the realized profits earned by defense contractors. DIAC concluded that interest expense should remain unallowable, but the progress payment rate should be increased. In addition to the rate increase, a uniform standard for rates was established in lieu of the discretionary provisions for lower progress payments that were previously allowed. The Total Costs clause and the Direct Labor and Materials Cost clause were eliminated, and the Progress Payments clause was created.

Another important study, conducted in 1971 by DIAC, laid the foundation for other policy changes. It was determined that the policy toward certain expenditures needed further refinement in order to preclude the possibility of negative contractor investment in the work-in-process inventory (i.e., more financed by DoD than actually spent by the contractor). As a result, the following policy changes became effective on January 1, 1972: (10)

1. Progress payments were limited to no more frequently than bi-weekly,
2. Items purchased directly for the contract were not eligible for progress payments until actually paid by the contractor (did not apply to small business concerns), and

3. The inclusion of profit expectations in progress payment liquidations from contract deliveries (i.e., use of alternate liquidation method) was to be more controlled.

It was recognized by DoD that these policy changes would result in increased financing costs to defense contractors. To offset this increase, contracting officers were instructed to add a factor to profit. This factor was mandatory and was to be computed as follows: the factor for new cash disbursement policy (item 2 above) was .8% of direct purchases and the factor for new bi-weekly frequency policy (item 1 above) was .07% of total costs. Combined, the added profit would have equated to roughly .4% of total costs. (11)

With two exceptions, DoD's policies on progress payments, especially as they related to levels of contract financing, were basically unchanged throughout the remainder of the 1970's. In 1973, DoD required that contractors make cash contributions to pension fund accounts within 30 days after the close of the accounting period covered by the contribution. In 1976, Cost Accounting Standard (CAS) 406, "Cost Accounting Period," required contractors to use annualized indirect expense rates instead of cumulative year-to-date actual amounts.

In 1980, there was considerable opinion that the level of progress payments needed to be raised. The increase in the volume and cost of contract financing undertaken by defense contractors was believed to have had an adverse impact on the viability of the defense industrial base. Volume increases were caused by changes in the acquisition environment, such as more fixed-price contracts, longer lead-times, reduced government-furnished property, higher asset replacement costs, etc. The increased costs of financing were reflected in the Short Term Commercial Loan Rate which rose from 6% in 1968 (when the rate was set at 80%) to 20% in 1979. In their report entitled, "The Ailing Defense Industrial Base: Unready for Crisis," the Defense Industrial Base Panel of the House Armed Services Committee concluded the following: (2)

The panel realizes that progress payments provide a degree of protection to the Government against the failure of a contractor to perform under the contract. However, in view of high inflation and interest rates, current progress payments may be placing an inordinate burden on defense industry...While progress payments at the 80% percent rate may provide a higher degree of protection to the Government, other aspects may well work against the Government's interests in improving productivity.

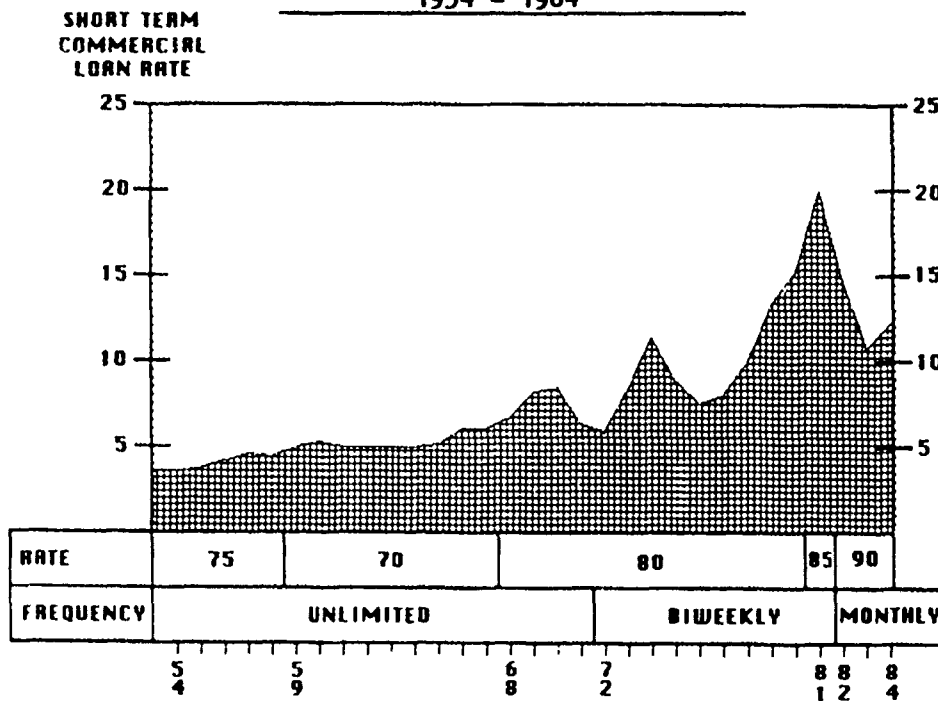
On January 14, 1981, the Deputy Secretary of Defense approved two actions: (1) raise the progress payment rate to 85% as an interim measure, and (2) develop a flexible progress payment policy which would give more attention to the variables affecting levels of actual contract financing. (12) The action in the latter instance was prompted by a November 1980 study performed by the Deputy Under Secretary of Defense for Acquisition Policy. This study observed that, even though uniform standard progress payment rates are used, the actual levels of contract financing received on individual contracts may vary considerably. This

is due to several variables affecting cash flow (i.e., period of contract performance, contractor payment lags, Government payment lags, etc.). The first action was taken on March 3, 1981. (13) The second action was completed on August 28, 1981, when the following additional policy changes were made. (14)

1. Raise customary progress payment rate from 85% to 90%,
2. Reduce progress payment frequency from bi-weekly to monthly, and
3. Allow optional flexible progress payments which would base the progress payment rate (up to 100%) on the contractor's average investment of 5% in the work-in-process inventory. This would be accomplished via the CASHII computer model.

As a summary of the background, the chart at Exhibit 1 depicts DoD's progress payment policies throughout the period 1954 to 1984, along with the Short Term Commercial Loan Rate published by the Federal Reserve Board.

**EXHIBIT 1**  
**DOD's PROGRESS PAYMENT POLICIES**  
**1954 - 1984**



On May 1, 1985, the Secretary of Defense lowered the customary progress payment rates for large business to 80%, for small business to 90%, and increased the required contractor investment under optional flexible progress payments to 15%. This change was made with the proviso that it would be reconsidered, if appropriate, based on the conclusions of DFAIR.

## CURRENT CRITICISMS

In recent years, the contract financing policies have been criticized from a number of sources. Most of this criticism is linked to views expressed in the President's Private Sector Survey on Cost Control (also known as the Grace Commission). The Grace Commission's Report on Financial Asset Management opined that, by reducing progress payments from 90% to 80%, the Government would save \$9.4 billion in cash outlays and \$1.7 billion in interest over the next three years. (15) The outlays would benefit DoD, and the interest savings would benefit the Treasury Department. The outlay reductions and interest savings computed by the Grace Commission are summarized in Exhibit 2.

A joint review of the Grace Commission's major recommendations was performed by the Congressional Budget Office (CBO) and the General Accounting Office (GAO). In their February 1984 joint report, the CBO took issue with the Grace Commission's predicted cash outlay reductions. The CBO estimated the amount to be \$6.2 billion but also added that this amount would be completely offset as each contract was completed and the remaining sums owed to contractors were paid as part of the delivery payment. (16) Specific computations of the \$6.2 billion were not disclosed in this report. In addition, the CBO did not support the Grace Commission's estimate of interest savings, stating that profit rate increases to compensate for the contractor's higher financing costs would offset some or all of the Grace Commission's estimated savings. That is, interest savings received by the Treasury Department would be offset by higher contract prices in awards made by the Defense Department. The GAO also did not believe that the Grace Commission's estimates for interest savings were realistic, because price increases that would be granted to defense contractors would compensate for lower progress payments. GAO later reaffirmed their view in a report to the Chairman, Senate Committee on Governmental Affairs, on February 19, 1985. (17)

A more recent criticism was offered by the DoD Inspector General (DoD IG) in their April 1985 report entitled, "DoD Policies on the Use of Progress Payments." They concluded the following: (18)

Current progress payment rates used to compute the amount of Government payments to military contractors are too high, given present interest rates, the rate of inflation, and other factors used to justify increases in the rates in 1980 and 1981. Reducing current progress payment rates to 80 percent for large businesses and 85 percent for small businesses would save the Government \$250 million per year in interest costs, and reduce FY 1985 estimated cash outlays by approximately \$2.1 billion.

The basic approach used by the DoD IG was similar to the Grace Commission's approach, except that the methods used to measure contracts eligible for reduced progress payments were significantly different. The Grace Commission began with the amount of fixed-price contracts awarded in 1982. The DoD IG began with the amount of contract awards funded in 1985 (with 1983, 1984, and 1985 appropriations). The detailed computations of the DoD IG outlay reductions and interest savings are presented in Exhibit 3. The core of the DoD IG analysis was a trend assessment of the economic factors for the period 1979 to 1st quarter 1984. These are recapped as Exhibit 4.

**EXHIBIT 2**  
**RECAP OF GRACE COMMISSION ANALYSIS**  
**COMPUTATION OF SAVINGS**  
**(\$ MILLIONS)**

	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>TOTAL</u>
<b>BASELINE</b>				
-----				
FIXED PRICE CONTRACTS (1982)	\$77,255			
LESS SHIPBUILDING/CONSTRUCTION	<u>11,200</u>			
ADJUSTED FIXED PRICE CONTRACTS	66,055			
WEIGHTED AVERAGE MARKUP RATE (1982)	<u>13.7%</u>			
COSTS OF FIXED PRICE CONTRACTS	58,096	58,096	58,096	174,288
PERCENT ESCALATION		<u>10%</u>	<u>10%</u>	
ADJUSTED COSTS OF FIXED PRICE CONTRACTS	58,096	63,905	70,296	192,297
PERCENT ELIGIBLE FOR PROGRESS PAYMENTS	<u>100%</u>	<u>100%</u>	<u>100%</u>	
COSTS ELIGIBLE FOR PROGRESS PAYMENTS	<u>\$58,096</u>	<u>\$63,905</u>	<u>\$70,296</u>	<u>\$192,297</u>
	=====	=====	=====	=====
<b>OUTLAYS REDUCTIONS</b>				
-----				
PROGRESS PAYMENT REDUCTIONS	\$ 5,810	\$ 6,391	\$ 7,030	\$ 19,230
PERCENT NEW CONTRACTS	<u>25%</u>	<u>75%</u>	<u>100%</u>	
AVAILABLE REDUCTION	1,452	4,793	7,030	13,275
OUTLAY DISTRIBUTION YEAR 1	100%			1,452
OUTLAY DISTRIBUTION YEAR 2		100%		4,793
OUTLAY DISTRIBUTION YEAR 3			100%	7,030
				<u>13,275</u>
OUTLAY REDUCTIONS	1,452	4,793	7,030	13,275
DISTRIBUTION OF YEAR 1 DELIVERIES		(726)	(726)	(1,452)
DISTRIBUTION OF YEAR 2 DELIVERIES			(2,397)	(2,396)
DISTRIBUTION OF YEAR 3 DELIVERIES				
				<u>      </u>
OUTLAY INCREASES		(726)	(3,123)	(3,849)
				<u>      </u>
NET OUTLAY REDUCTION	<u>\$ 1,452</u>	<u>\$ 4,067</u>	<u>\$ 3,907</u>	<u>\$ 9,426</u>
	=====	=====	=====	=====
<b>INTEREST SAVINGS (AT 10%)</b>				
-----				
INTEREST ON YEAR 1	\$ 145.2	\$ 159.8	\$ 175.7	\$ 480.7
INTEREST ON YEAR 2		406.7	447.3	854.0
INTEREST ON YEAR 3			390.7	390.7
				<u>390.7</u>
TOTAL INTEREST SAVINGS	<u>\$ 145.2</u>	<u>\$ 566.4</u>	<u>\$1,013.8</u>	<u>\$1,725.4</u>
	=====	=====	=====	=====

**EXHIBIT 3**  
**RECAP OF DOD IG ANALYSIS**  
**COMPUTATION OF SAVINGS**  
**(\$ MILLIONS)**

<u>FY 85 OBLIGATIONS</u>	<u>FY 85 CONTRACTS FUNDED USING APPROPRIATIONS FROM:</u>			
	<u>FY 83</u>	<u>FY 84</u>	<u>FY 85</u>	<u>TOTAL</u>
PROCUREMENT CONTRACTS*	\$ 6,311	\$12,410	\$107,586	\$126,307
FY 85 OUTLAY PERCENT (ROUNDED)	<u>11%</u>	<u>13%</u>	<u>13%</u>	
OUTLAY AMOUNT	709	1,562	14,226	16,497
PERCENT RECEIVING FOR PROGRESS PAYMENTS	<u>85%</u>	<u>85%</u>	<u>85%</u>	
PROGRESS PAYMENT OUTLAYS	603	1,327	12,092	14,022
MILITARY CONSTRUCTION CONTRACTS	223	727	7,158	8,108
FY 85 OUTLAY PERCENT (ROUNDED)	<u>14%</u>	<u>14%</u>	<u>14%</u>	
OUTLAY AMOUNT	32	102	1,001	1,135
PERCENT RECEIVING FOR PROGRESS PAYMENTS	<u>100%</u>	<u>100%</u>	<u>100%</u>	
PROGRESS PAYMENT OUTLAYS	32	102	1,001	1,135
OPERATIONS & MAINTENANCE CONTRACTS			7,000	7,000
FY 85 OUTLAY PERCENT (ROUNDED)			<u>78%</u>	
OUTLAY AMOUNT			5,492	5,492
PERCENT RECEIVING FOR PROGRESS PAYMENTS			<u>100%</u>	
PROGRESS PAYMENT OUTLAYS			5,492	5,492
TOTAL PROGRESS PAYMENT OUTLAYS	<u>\$ 635</u> =====	<u>\$ 1,429</u> =====	<u>\$ 18,585</u> =====	<u>\$ 20,649</u> =====
10% PROGRESS PAYMENT REDUCTION	<u>\$ 64</u> =====	<u>\$ 143</u> =====	<u>\$ 1,858</u> =====	<u>\$ 2,065</u> =====
INTEREST RATE				<u>10.7%</u>
TOTAL INTEREST SAVINGS**				<u>\$ 220</u> =====

\* INCLUDES SHIPBUILDING CONTRACTS TALLING \$15.7 BILLION

\*\* FIRST YEAR IS ONE-HALF OR \$110 MILLION

**EXHIBIT 4**  
**DOD IG TREND ASSESSMENT**  
**1979 TO 1st QTR 1984**

<u>ECONOMIC FACTORS</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>FIRST QUARTER 1984</u>
PRIME INTEREST RATE	12.7%	15.3%	18.9%	14.9%	10.7%	11.1%
SHORT TERM TREASURY BILL RATE	10.2	11.8	15.1	11.4	8.9	9.5
CONSUMER PRICE INDEX	11.7	13.5	10.4	6.1	3.2	2.7

The Under Secretary of Defense for Research and Engineering did not agree with the DoD IG's assessment of the potential for outlay reductions and interest savings, for the same reasons the CBD and GAO questioned the Grace Commission's findings. (19)

In addition to levels of progress payments (i.e., rates), DoD has been criticized for its policies toward prompt payment of progress payments. This criticism has been predominantly raised by the Office of Management and Budget (OMB), whose recently promulgated Attachment 1 to Circular A-125, "Prompt Payment," states that, unless a contract specifically provides otherwise, progress payments should not be paid until 30 days after receipt by the paying officer. (20) DoD's policy has been to pay progress payments as quickly as possible, normally within 5 to 10 days. (21) OMB believes that this period for payment is too fast, preferring instead, that DoD delay payment for 30 days. It should also be noted that OMB has extended this criticism to delivery payments, as well.

**ANALYSIS**

**The Issue of Allowable Interest**

DoD's policies on contract financing have been closely linked with its attitudes toward unallowable interest expenses. Therefore, analysis of contract financing, whether from an historical or quantitative perspective, must also consider DoD's reasons for disallowing such costs.

Since the first set of formal cost principles, issued in 1942, the Government has regarded contractor interest to be an unallowable cost. While DoD has agreed that interest is an ordinary and necessary cost of doing business with the Government, the policy was to compensate contractors through alternative means. The major reasons for not allowing interest were as follows:

- Allowable interest created an incentive toward debt financing over equity financing. It raised the possibility of contractors using available cash for investment and borrowing needed cash to perform contracts.



- Debt financing can be undertaken for many reasons, several unrelated to the performance of defense contracts (e.g., payment of stockholder dividends, corporate acquisitions, retirement of treasury stock).
- Reliable cost measurement and allocation methods which show financing costs of defense contracts (aggregate or individual) were not available.
- Allowing interest gave large businesses, particularly the cash rich businesses, a significant competitive advantage over smaller businesses.

Instead of allowing interest (source oriented policy), DoD opted for alternatives which would reduce a contractor's need for borrowing (use oriented policy). This was accomplished by providing progress payments and recognizing the balance of the contractor's capital investment within the contracting officer's profit objective. Simply put, the combination of progress payments and markup recognition were to compensate defense contractors for capital use (both facilities capital and working capital).

During the 1970s, there were three major efforts undertaken to provide a more explicit compensation for capital costs. The first was in 1972 when DoD experimented with a profit policy which based 50% of the profit on facilities capital and working capital use (reference Defense Procurement Circular 107). The methodology employed proved to be too complex, and the experiment was ultimately discontinued. The second initiative occurred in 1976 under the "Profit '76" study. DoD removed the use of facilities capital from the implicit markup recognition to an explicit recognition as a contract cost. At the same time, the CAS Board promulgated CAS 414, "Cost of Money as an Element of Facilities Capital." This standard furnished measurement and allocation criteria for the imputed value of facilities capital costs. The third initiative was undertaken by the CAS Board in 1978, which attempted to issue a standard similar to CAS 414 on operating capital. This project was suspended by the CAS Board for the following reasons:

(22)

- Identification, measurement, and verification of segment (as opposed to corporate) operating capital items were difficult.
- Many types of operating capital items made it difficult to establish an acceptable surrogate for measurement under varying conditions.
- It was unlikely that individual contract use of operating capital could be accurately determined.
- Contractors should have an incentive to keep operating capital at the minimum necessary level.

In summary, there has been a clear link between the issue of unallowable interest and DoD's contract financing and markup policies. However, because these policies indirectly (or implicitly) compensated contractors for such costs, there has been widespread confusion. Many attempts have been made by DoD to make the recognition more explicit (e.g., DIAC studies, Defense Procurement Circular 107, Profit '76, CAS Board projects), but a satisfactory method for dealing with

operating capital has not been developed. However, the criticisms directed at DoD's contract financing policies implicitly assume there are no interrelationships between interest, contract financing, and markup. The estimates of interest savings by the Grace Commission (\$1.7 billion) and DoD IG (\$250 million annually) do not include the potential for offsetting markup increases. Both the CBO and GAO did give recognition to this potential, as shown below:

CBO View -

The major effect of this (Grace Commission) recommendation would be to slow the flow of cash payments from the government to defense contractors. The commission assumed that the total cost over the life of the contracts would be unchanged. Given the slowing of payments, however, defense contractor profits would be reduced by the added cost of financing a greater portion of the contract. Therefore, negotiated markup and/or fee rates may increase and offset some or all of the estimated savings.

GAO View -

GAO does not believe that the savings estimated are realistic. This assessment is based on the strong belief that contractors will frequently demand and receive terms of value commensurate with the privilege they are surrendering (progress payments). Accordingly, if the recommendation were implemented, GAO doubts that savings of the magnitude cited could be achieved.

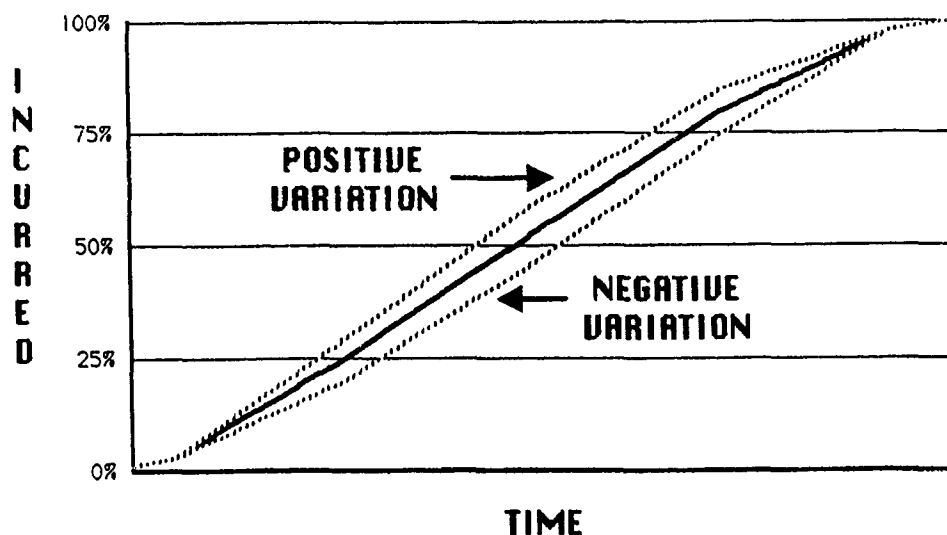
Analytical Framework

There are two sources of funds available to a contractor for financing the work-in-process inventory: debt (borrowed funds) and equity (owned funds). Both have a real cost to the contractor, either as an interest expense for debt financing or as an imputed opportunity cost for equity financing. This presents an analytical problem because, while interest expense is discretely measurable and reported in financial statements, imputed opportunity cost from using equity financing is not. The problem is further compounded because interest, although measurable at the corporate level, is not measurable on a contract-by-contract basis.

To analyze the working capital requirements of defense contracts, a "typical" contract was created from the actual performance on selected contracts. Twelve recently completed contracts, representing major end-items (e.g., aircraft, missiles, vehicles, electronics) were used to build a composite cost and delivery profile. The relative cost incurrence patterns of the sample (i.e., percentage cost incurred vs. percentage time elapsed) was highly similar for most of the contracts. A "best fit" curve was derived, as well as two additional curves from the range limits representing positive and negative variations. The positive

variation reflects a pattern where working capital requirements accumulate earlier than the "typical" contract scenario; the negative variation reflects later accumulations. These are graphically shown in Exhibit 5:

**EXHIBIT 5**  
**COST INCURRENCE PATTERNS OF "TYPICAL" CONTRACT**  
**TO BE USED FOR SIMULATION ANALYSIS**



The cash disbursement and Government reimbursement variables of five separate defense contractors were used to establish average float times for contract costs, such as direct labor, direct material, overhead, etc. The disbursement and reimbursement lags (float times) had been previously audited by the DCAA. In order to assess contract financing requirements that existed under varying DoD policies (depicted in Exhibit 1), float times were developed for monthly, bi-weekly, and weekly progress payments. Because of the paid cost requirement for items purchased directly for the contract, it was also necessary to establish separate float times for the period 1971 and before and the period 1972 and after. These float times are illustrated in Exhibits 6 and 7, respectively.

**EXHIBIT 6**  
**FLOAT TIMES FOR COMPUTER SIMULATION**  
**YEARS 1971 AND BEFORE**  
**(USES 28 DAY MONTH)**

ITEM	COST DISTRIBUTION PERCENTAGE*	PROGRESS PAYMENT FREQUENCY	DAYS LAG BETWEEN COST INCURRENCE AND PAYMENT				PAYMENT TERMS
			WEEK 1	WEEK 2	WEEK 3	WEEK 4	
DIRECT LABOR	20%	Weekly	-10	- 3	-10	- 3	Bi-Weekly Payroll
		Bi-Weekly Monthly		- 3		- 3 + 4	
MATERIAL	44%	Weekly	-30	-30	-30	-30	Due Net 30 Days
		Bi-Weekly Monthly		-27		-27 -20	
INDIRECT LABOR	12%		(SAME AS DIRECT LABOR)				
PAYROLL ACCRUALS	12%	Weekly	-81	-74	-67	-60	Due 60 Days From EOM
		Bi-Weekly Monthly		-74		-60 -60	
OTHER OVERHEAD	12%	Weekly	-51	-44	-37	-30	Due 30 Days From EOM
		Bi-Weekly Monthly		-44		-30 -30	
COMBINED	100%	Weekly	-32	-28	-29	-25	
		Bi-Weekly Monthly		-27		-23 -18	

\*SOURCE: DD FORM 1499 DATA BASE

**EXHIBIT 7**  
**FLOAT TIMES FOR COMPUTER SIMULATION**  
**YEARS 1972 AND AFTER**  
**(USES 28 DAY MONTH)**

ITEM	COST DISTRIBUTION PERCENTAGE*	PROGRESS PAYMENT FREQUENCY	DAYS LAG BETWEEN COST INCURRENCE AND PAYMENT				PAYMENT TERMS
			WEEK 1	WEEK 2	WEEK 3	WEEK 4	
DIRECT LABOR	20%	Weekly	-10	- 3	-10	- 3	Bi-Weekly Payroll
		Bi-Weekly		- 3		- 3	
		Monthly				+ 4	
SERIAL	44%	Weekly	+ 5	+ 5	+ 5	+ 5	Due Net 30 Days
		Bi-Weekly		+ 9		+ 9	
		Monthly				+16	
(SAME AS DIRECT LABOR)							
INDIRECT LABOR	12%	Weekly	-81	-74	-67	-60	Due 60 Days From EOM
		Bi-Weekly		-74		-60	
		Monthly				-60	
OTHER OVERHEAD	12%	Weekly	-51	-44	-37	-30	Due 30 Days From EOM
		Bi-Weekly		-44		-30	
		Monthly				-30	
COMBINED	100%	Weekly	-17	-13	-13	-10	
		Bi-Weekly		-11		- 8	
		Monthly				- 3	

\*SOURCE: DD FORM 1499 DATA BASE

Next, a computer simulation model was developed in order to perform a sensitivity analysis of the major variables which would affect financing costs on the work-in-process inventory. Variables include DoD's progress payment policies (e.g., rate, frequency, speed of payment), interest rates, contract costs and delivery profiles, length of contract, and float times. The "typical" contract served as a baseline for the analysis. Other baseline variables were as follows:

- Period of performance = 40 months
- 90% of costs incurred between 4th and 38th month
- 4 equal deliveries in 34th, 36th, 38th, and 40th month
- No progress payment made in last month (becomes part of residual delivery payment)
- Progress payment frequency = monthly
- Speed of progress payment = 5 days
- Speed of delivery payment = 15 days
- Simple interest at the Short Term Commercial Loan Rate (developed by Federal Reserve Board)

The model divides financing costs into three groupings: interest on paid cost float, interest on Government payment delay, interest on unbilled end-of-month inventory. The total of these three groupings represents the contractor's imputed financing costs (whether actual financing is furnished through debt or equity sources is irrelevant). The model also reflects this amount as a percentage of total contract costs. This would give an indication of how much profit would be consumed by contract financing costs. Exhibit 8 demonstrates how the model works, using the baseline variables shown above. The negative interest on paid costs takes into account that the contractor at month-end has not actually made cash disbursements for all costs incurred. At 90% progress payments paid on a monthly basis, the imputed interest would be 1.75% of total costs for the "typical" contract (1984 Short Term Commercial Loan Rate = 12.02%). The earlier cost incurrence pattern under the positive variation yielded 1.89%, and the later working capital accumulation under the negative variation pattern yielded 1.61%. Exhibit 8 shows the model output for the typical contract.

It is recognized that there are several interest rates which could be used to compute contractor financing costs. The critical point is to use a rate which would be representative of true borrowing costs across the defense industry. Some contractors can borrow at rates lower than the Short Term Commercial Loan Rate (e.g., commercial paper rate); however, other contractors have to borrow at higher rates (e.g. prime plus). From an analytical perspective, the Short Term Commercial Loan Rate was considered to be the most appropriate indication of interest rates.

The 40-month period of performance was an average, as were delivery patterns. While there are both longer and shorter contract lengths, a 40-month period was regarded as the most reasonable baseline to assess the overall contract financing policy. This baseline was used to demonstrate the sensitivity of changing the pertinent variables affecting contractor financing costs, such as other cost incurrence and delivery patterns, length of contract, etc.

**EXHIBIT 8**  
**CASH FLOW ANALYSIS OF "TYPICAL" CONTRACT**  
**CONTRACTOR FINANCING COSTS**

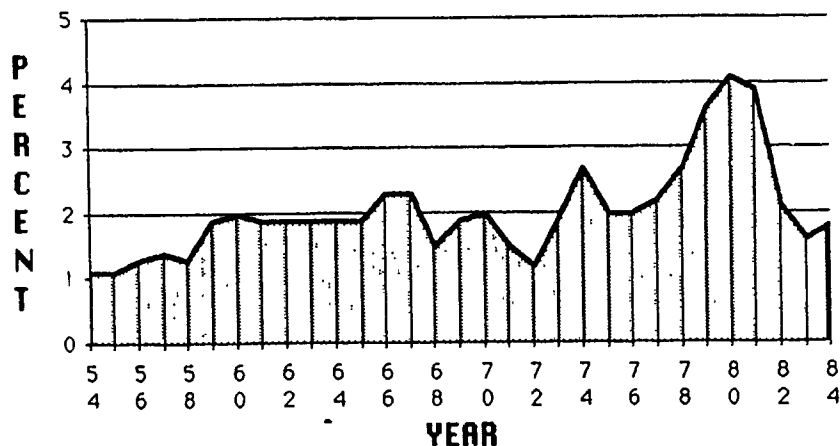
MONTH	COSTS INCURRED	PROGRESS PAYMENT BILLED	DELIVERY PAYMENT BILLED	EOM UNBILLED INVENTORY	CONTRACTOR SIMPLE INTEREST ON			
					PAID COST FLOAT	PAYMENT DELAYS	UNBILLED INVENTORY	TOTAL INTEREST
1	46,648	41,983	0	4,665	-47	70	47	70
2	74,137	66,723	0	12,079	-74	111	121	158
3	83,300	74,970	0	20,409	-83	125	204	246
4	188,552	169,697	0	39,264	-189	283	393	487
5	250,576	225,518	0	64,321	-251	376	643	769
6	271,250	244,125	0	91,446	-271	487	914	1,050
7	271,250	244,125	0	118,571	-271	487	1,186	1,321
8	271,250	244,125	0	145,696	-271	487	1,457	1,593
9	271,250	244,125	0	172,821	-271	487	1,728	1,864
10	271,250	244,125	0	199,946	-271	487	1,999	2,135
11	271,250	244,125	0	227,071	-271	487	2,271	2,406
12	293,583	264,225	0	256,430	-294	440	2,564	2,711
13	306,743	276,069	0	287,104	-307	460	2,871	3,024
14	311,130	280,017	0	318,217	-311	467	3,182	3,338
15	311,130	280,017	0	349,330	-311	467	3,493	3,649
16	311,130	280,017	0	380,443	-311	467	3,804	3,960
17	311,130	280,017	0	411,556	-311	467	4,116	4,271
18	311,130	280,017	0	442,669	-311	467	4,427	4,582
19	311,130	280,017	0	473,782	-311	467	4,738	4,893
20	311,130	280,017	0	504,895	-311	467	5,049	5,205
21	300,632	277,769	0	535,758	-309	463	5,358	5,512
22	307,161	276,445	0	566,474	-307	461	5,665	5,818
23	306,670	276,003	0	597,141	-307	460	5,971	6,125
24	306,670	276,003	0	627,808	-307	460	6,278	6,431
25	306,670	276,003	0	658,475	-307	460	6,585	6,738
26	306,670	276,003	0	689,142	-307	460	6,891	7,045
27	306,670	276,003	0	719,809	-307	460	7,198	7,351
28	306,670	276,003	0	750,476	-307	460	7,505	7,656
29	306,670	276,003	0	781,143	-307	460	7,811	7,965
30	258,835	232,951	0	807,027	-259	368	8,078	8,200
31	230,646	207,581	0	830,091	-231	346	8,301	8,416
32	221,250	199,125	0	852,216	-221	332	8,522	8,633
33	221,250	199,125	0	874,341	-221	332	8,743	8,854
34	221,250	199,125	250,000	646,466	-221	1,582	6,465	7,825
35	221,250	199,125	0	668,591	-221	332	6,686	6,797
36	221,250	199,125	250,000	440,716	-221	1,582	4,407	5,768
37	221,250	199,125	0	462,841	-221	332	4,628	4,739
38	143,996	129,598	250,000	227,241	-144	1,466	2,272	3,594
39	98,474	88,627	0	237,009	-98	148	2,371	2,420
40	129,115	0	366,283	0	-129	1,831	0	1,762
TOTAL	10,000,000	8,883,796	1,116,203	0	-10,000	20,387	164,936	175,323

TOTAL CONTRACTOR INTEREST IS \$ 175,323 WHICH IS 1.75 % OF TOTAL COSTS

### Historical Perspective

The "typical" contract and associated baseline data were evaluated against the DoD progress payment policy and actual Short Term Commercial Loan Rate for each year since 1954 (the first year of DoD's uniform progress payment policy). This would indicate the relative amount of financing costs incurred by defense contractors from year-to-year. A summary chart is presented in Exhibit 9 below. It must be stressed that the "typical" contract provides a method of evaluating the impact of changes in DoD policy and interest rates. Furthermore, other interest rates could be used, but the relative changes would likely be the same. This was confirmed by using the Prime Rate in lieu of the Short Term Commercial Loan Rate.

**EXHIBIT 9**  
**CONTRACTOR FINANCING COSTS**  
**AS PERCENTAGE OF TOTAL COSTS**  
**1954 - 1984**



Since the progress payment policy was established in 1954, the level of investment required of defense contractors yielded imputed financing costs of roughly 2% of total costs. As shown in Exhibit 10, the financing costs on the "typical" contract fell within plus or minus .5 points (i.e., between 1.5% and 2.5%) for most years. There were six years that fell below that range (1954-1958, 1972) and five years that were above (1974, 1978-1981).



**EXHIBIT 10**  
**SUMMARY OF CONTRACTOR FINANCING COSTS**  
**AS % OF TOTAL COSTS**  
**1954 - 1984**

---

<u>FINANCING COSTS</u>	<u>NUMBER OF YEARS</u>	<u>DISTRIBUTION</u>
LESS THAN 1.5%	6	19%
1.5% - 2.5%	20	65
MORE THAN 2.5%	<u>5</u>	<u>16</u>
TOTAL	31	100%

Another important question that can be resolved through an historical perspective is whether today's policy, under current economic conditions, is consistent with prior financing levels required of defense contractors. Both the Grace Commission and DoD IG maintained that today's policies were not compatible with current economic trends. That is, because interest rates decreased from 15% in 1980 to 12% in 1984, the progress payment rates should also be decreased. However, the historical perspective does not support this claim. Financing costs for 1982-1984, under the DoD policy of a 90% progress payment rate and monthly payment frequency, were as follows:

**EXHIBIT 11**  
**CONTRACTOR FINANCING COSTS**  
**AS % OF TOTAL COSTS**  
**1982 - 1984**

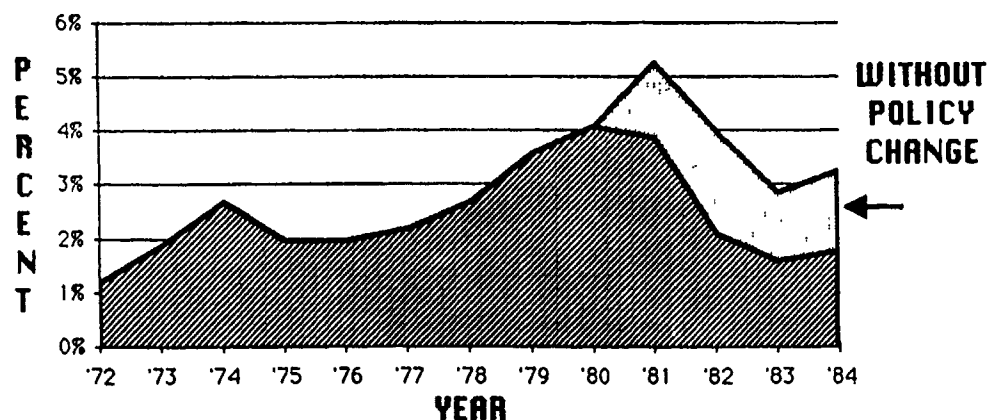
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	<u>SHORT TERM COMMERCIAL LOAN RATE</u>	<u>CONTRACTOR FINANCING COSTS</u>
1982	14.7%	2.14%
1983	10.6	1.55
1984	12.0	1.75

While the 1982-84 amounts are lower than the 1980 level (4.13%), they are not inconsistent with the totality of DoD's policies. Another consideration is that by using 1980 as a baseline for comparison, the highest point of contractor financing costs is being compared with the present level. In order to demonstrate today's economic conditions in relation to the past, Exhibit 12 reflects financing costs from 1972 if DoD had not changed its policies in 1980. The year 1972 was selected because that was when DoD adopted the bi-weekly frequency and the paid cost requirement for items purchased directly for the contract.

**EXHIBIT 12**  
**CONTRACTOR FINANCING COSTS**  
**AS % OF TOTAL COSTS**  
**1972 - 1984**

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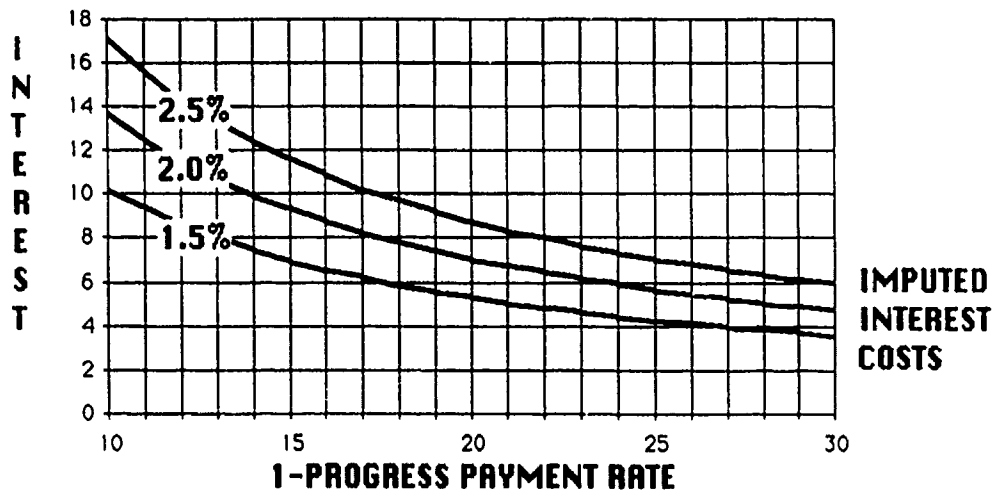
It should be noted that, because of higher interest rates being experienced in 1974, DoD considered raising the uniform standard progress payment rate from 80% to 85%. Interest rates fell in 1975 and, as a result, DoD elected not to raise the rates.

**Cash Flow Analysis Variables**

The primary determinants of a contractor's financing costs are the amount of contract financing furnished by the Government and the commercial interest rate that a contractor would incur to carry the unfinanced portion of the work-in-process inventory. Other variables are important, such as contract cost profiles, paid cost lags, contract delivery schedules, Government payment delays, etc. By using the "typical" contract simulation, it is possible to observe the sensitivity of changes in these variables.

As the first step in this analytical process, indifference curves were established which depict the relationship between progress payment rates and commercial interest rates at given levels of imputed financing costs. For example, what combinations of Government contract financing and interest rates yield imputed financing costs of 2% (the historical level of contractor financing)? Exhibit 13 demonstrates this relationship at imputed financing levels of 1.5%, 2.0%, and 2.5% (percentage of total contract costs).

**EXHIBIT 13**  
**CONTRACTOR FINANCING COSTS**  
**INDIFFERENCE CURVES**  
**(AS % OF TOTAL COSTS)**



The indifference curve for 2% reflects the needed combinations of Government financing and commercial interest rates to achieve this level of financing costs. For example, at 85% progress payments, the commercial interest rate would have to be roughly 9%. This illustration is summarized below in Exhibit 14 at varying progress payment rates.

**EXHIBIT 14**  
**"TYPICAL" CONTRACT**  
**INTEREST RATE NEEDED TO**  
**YIELD IMPUTED INTEREST COST OF 2%**  
**(AS % OF TOTAL COST)**

PROGRESS PAYMENT RATE	INTEREST RATE
70%	4.7%
75	5.6
80	7.0
85	9.3
90	13.7

### Variations in Cost Profile

By using the positive and negative variations to the "typical" contract, it is possible to assess differences in contract cost profiles. The positive variation was derived from the upper portion of the band surrounding the "typical" contract (see Exhibit 5). This curve reflects costs as being incurred at earlier stages of contract performance than under the "typical" contract. The positive variation means that a contractor will have to carry the unfinanced work-in-process inventory for a longer period of time and, thus, at a higher overall cost. Conversely, a negative variation is derived from the lower portion of the same band surrounding the "typical" contract. This is a delayed cost curve which results in lower financing costs to the contractor. Returning to the example of how much the commercial interest rate needed to be in order to yield an imputed financing cost of 2%, Exhibit 15 below superimposes the results of the two variations upon the previous exhibit. It shows that variations in the cost profile of a 40-month contract with multiple deliveries at the end have little impact on total financing costs.

**EXHIBIT 15**  
**IMPACT OF COST PROFILE**  
**INTEREST RATE NEEDED TO**  
**YIELD IMPUTED INTEREST COST OF 2%**  
**(AS % OF TOTAL COST)**

<u>PROGRESS PAYMENT RATE</u>	<u>POSITIVE VARIATION</u>	<u>"TYPICAL" CONTRACT</u>	<u>NEGATIVE VARIATION</u>
70%	4.4%	4.7%	5.2%
75	5.2	5.6	6.2
80	6.5	7.0	7.6
85	8.6	9.3	10.1
90	12.7	13.7	14.9

### Variations in Delivery Schedule

Next, variations in delivery schedule were measured against the "typical" contract. The delivery schedule used in the "typical" contract was derived from the general patterns of actual contract deliveries for the 12 contracts selected. In most cases, there were multiple deliveries toward the final stages of contract performance. The "typical" contract, therefore, included 4 deliveries of equal value in the 34th, 36th, 38th, and 40th months. In order to assess the sensitivity of delivery schedules on contractor financing, two extremes were also examined. In the first extreme, contract deliveries of equal value began in the 21st month and continued throughout the remainder of the contract (20 deliveries). In the other extreme, a single delivery in the 40th month was employed. The results are shown below in Exhibit 16.

**EXHIBIT 16**  
**IMPACT OF CONTRACT DELIVERIES**  
**INTEREST RATE NEEDED TO**  
**YIELD IMPUTED INTEREST COST OF 2%**  
**(AS % OF TOTAL COST)**

<u>PROGRESS PAYMENT RATE</u>	<u>MANY DELIVERIES</u>	<u>"TYPICAL" CONTRACT</u>	<u>SINGLE DELIVERY AT END</u>
70%	7.6%	4.7%	4.0%
75	9.1	5.6	4.8
80	11.2	7.0	6.0
85	14.8	9.3	7.9
90	21.7	13.7	11.7

The variations in contract deliveries can produce wide differences in contractor financing requirements. These differences were much wider than those observed for changes in cost patterns.

**Variations in Contract Length**

The "typical" contract also assumed a contract length of 40 months with 90% of the costs being incurred between the 4th and 37th month. The 40 months was an average derived from actual contracts. In order to assess further the impact of time, the contract lengths were modified to 28 months and 52 months (equates to "typical" contract plus and minus 1 year). The results are shown below in Exhibit 17. All variables other than contract length remain unchanged.

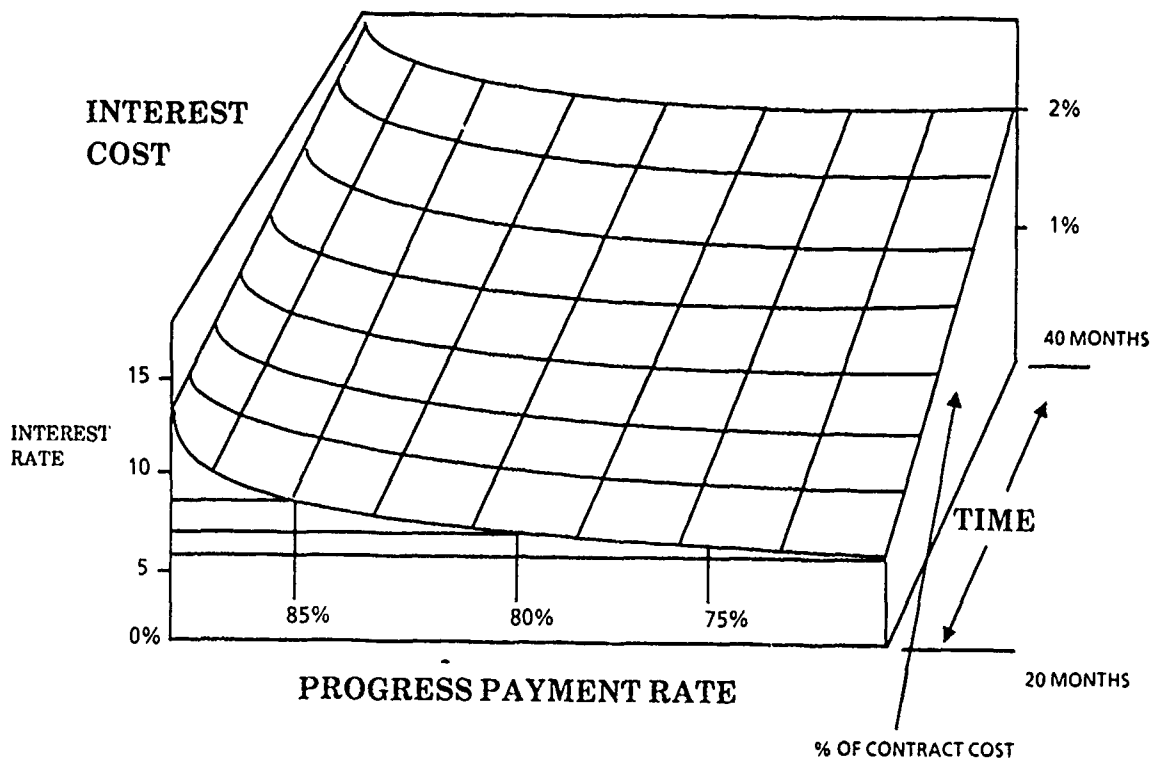
**EXHIBIT 17**  
**IMPACT OF CONTRACT LENGTH**  
**INTEREST RATE NEEDED TO**  
**YIELD IMPUTED INTEREST COST OF 2%**  
**(AS % OF TOTAL COST)**

<u>PROGRESS PAYMENT RATE</u>	<u>28 MONTHS</u>	<u>"TYPICAL" CONTRACT</u>	<u>52 MONTHS</u>
70%	7.4%	4.7%	3.5%
75	8.8	5.6	4.2
80	10.9	7.0	5.2
85	14.4	9.3	6.8
90	21.1	13.7	10.1

The amount of financing absorbed by contractors varies considerably with time. If the period of performance is relatively short, then the interest rate needed to produce an imputed financing cost must be much higher than the "typical" contract scenario.

However, as is shown in Exhibit 18, the relationship of time and financing costs is linear, while the financing cost indifference curve is the same shape as shown in exhibit 13, regardless of contract length. Thus, from a policy point of view, the indifference curve could be used as a basis to monitor interest rate changes and to readjust the progress payment rate to an "equitable" level (2% of costs on a 40 month contract; 1% of costs on a 20 month contract). Of course, the markup policy should also be changed to recognize explicitly the differences in financing costs associated with difference in time.

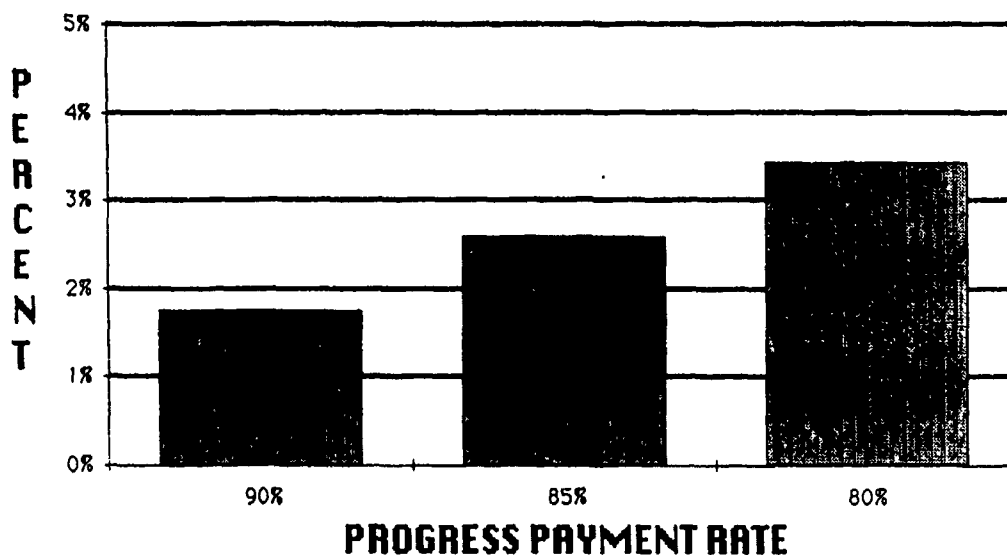
EXHIBIT 18



### Impact of Progress Payment Rate Changes

The Grace Commission and DoD IG have recommended roll-backs in the progress payment rates to earlier levels in order to be more compatible with current economic conditions. To assess the impact of progress payment rate reductions on contractor financing costs, all variables were frozen except for the progress payment rates. A commercial interest rate of 12% was assumed. The comparative results are shown below as Exhibit 19.

**EXHIBIT 19**  
**PROGRESS PAYMENT RATE ALTERNATIVES**  
**CONTRACTOR FINANCING COSTS**  
**(AS % OF TOTAL COST)**



Progress payments at the 90% level yielded financing costs of 1.75% as a percentage of contract costs (see Exhibit 8). This is roughly the equivalent level of contract financing historically provided defense contractors by DoD. At 80% progress payments, the financing costs would be 3.43% (almost double). It should be noted that in only three years did financing costs as a percentage of contract costs exceed 3% (1979-1981). These were the peak years of contractor financing, and they precipitated DoD's policy changes of 1981. Thus, the results of this comparative analysis would not support claims that economic conditions have substantially improved. While it is true that interest rates have declined, there are other factors which should have been taken into greater account:

- The Short Term Commercial Loan Rate in 1971, when the progress payment rate was increased from 70% to 80%, was 6.32%. Throughout most of the 1970's, the average interest rate was 8%. Today's interest rates must be compared with this level, not the peak levels of 1979-1981.
- After 1971, items purchased directly for the contract (e.g., direct material) were not eligible for progress payments until actually paid for by the contractor. The profit recognition for this change (roughly .4%) was discontinued in 1976.
- In 1981, the progress payment frequency was reduced from bi-weekly to monthly.

#### Government Contract Payment Policies

The frequency and timing of Government payments are two more variables which can greatly influence levels of contractor financing. As previously discussed, the frequency of progress payments was unlimited until 1972. At that time, such payments were restricted to no more frequent than bi-weekly. In 1981, along with the progress payment rate increase from 85% to 90%, the frequency was limited further to monthly. The impact of reducing the progress payment frequency was roughly .2% of total contract costs. This would equate to a progress payment rate reduction, using the simulation model, of 2 percentage points. That is, 90% progress payments paid on a monthly basis would equal 88% paid on a bi-weekly basis.

The other benefit from the reduced frequency is lower associated administrative costs in that the volume of progress payments processed by Government paying officers was cut by 50%. This allows more resources for processing timely delivery payments, which under the Prompt Payment Act would incur an interest penalty if not paid when due. For Fiscal Years 1983 and 1984, DoD reported interest penalties paid under this Act as shown below:

#### EXHIBIT 20 INTEREST PENALTIES PAID BY DOD UNDER PROMPT PAYMENT ACT FISCAL YEARS 1983 AND 1984

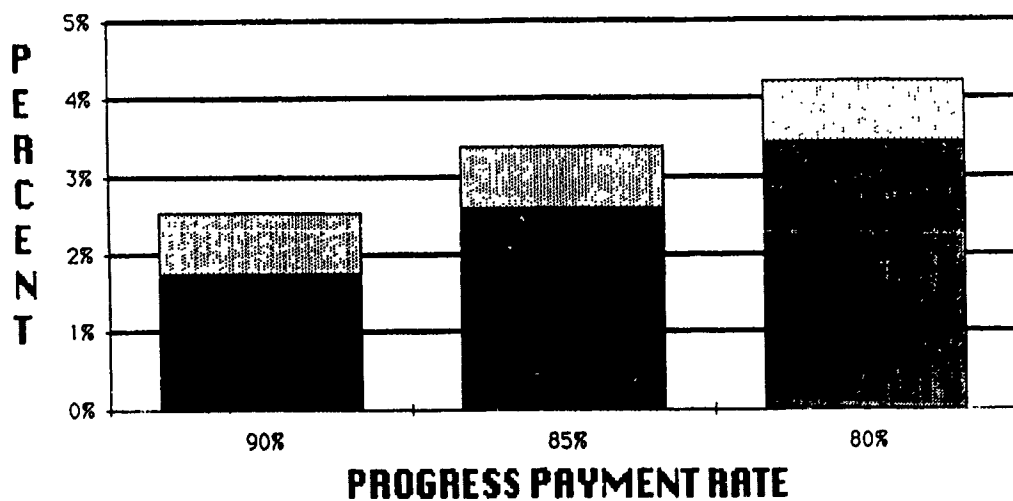
	<u>FY 83</u>	<u>FY 84</u>
PENALTIES PAID	\$2 MILLION	\$4 MILLION
NUMBER OF PENALTIES	118,689	173,926
NUMBER AS % OF TOTAL	1%	1%



In addition to frequency of payment, timing of payment affects levels of contract financing. DoD's policy has been to make contract financing payments as quickly as possible, normally in 5 to 10 days. OMB has been critical of this policy, believing that such payments should not be made until 30 days after the Government paying officer receives the request for payment. Attachment 1 to OMB Circular A-125 was published on July 10, 1984, and requires that, unless a contract specifies otherwise, payment shall not be made for 30 days. DoD has taken action to revise the regulations to provide for progress payments within a norm of 5 to 10 days. Nevertheless, OMB still maintains that 30 days would be more appropriate.

The same OMB criticism is directed toward DoD's policies on delivery payments. Current DoD acquisition regulations incorporated a January 4, 1983 policy issued by the Deputy Under Secretary of Defense for Acquisition Management. (23) For contracts containing contract financing provisions, delivery payments are normally made within 5 to 10 days after receipt of an invoice (provided that goods and services have been received and accepted by the Government). Separate additional payment policies are directed toward items purchased against commercial or military specifications. Slowing down payments to the degree suggested by OMB (e.g., 30 days for progress payments and delivery payments) would increase contractor imputed financing costs by approximately one additional percentage point. A higher amount may occur to the extent that Government paying officers use the 15-day grace period beyond the 30-day period. The impact is graphically depicted in Exhibit 21.

**EXHIBIT 21**  
**PROGRESS PAYMENT RATE ALTERNATIVES**  
**WITH OMB's PAYMENT DELAY**  
**CONTRACTOR FINANCING COSTS**  
**(AS % OF TOTAL COST)**



Delaying payment and maintaining the current (80%) progress payment rates would result in contractor financing to a level more than double historical experience (4.2% vs. 2.0%). The increase would be significant even at lower commercial interest rates. For example, if the commercial interest rate were 10% (not 12%), the combination of 80% progress payments paid on a monthly basis with a 30 day delay would yield contractor financing of 3.5%.

### PROGRESS PAYMENTS AND OUTLAY REDUCTIONS

The widest difference of opinion centers on the projections of outlay reductions and interest savings which would result from a roll-back of progress payment rates to 1981 levels. Fundamental to these projections is the question of how much of the contractor's additional financing costs would be passed on to the Government. The Grace Commission and DoD IG maintain that there would be no increase in prices. The CBO and GAO, on the other hand, believe price increases would offset interest savings to the Government. An analysis performed within the Office of the Under Secretary of Defense for Research and Engineering in 1983 went even further by suggesting that the magnitude of price level increases would cause an increase in outlays. The report summarized its views as follows: (24)

Although some short-term reductions in outlays could be achieved by either lowering progress payment rates or delaying payments, the concomitant and very achievable price increases would cause the outyear outlays to be substantially higher. In total, such changes would cost both the Department of Defense and the Government more on a discounted cash flow basis.

### Cash Outlays

The Grace Commission believes that the cash outlays would be \$9.4 billion over three years. The CBO believes the amount is \$6.2 billion for three years. The DoD IG said that there would be a reduction of \$2.1 billion in Fiscal Year 1985. The approaches used by the Grace Commission and the DoD IG were very similar (detailed computations by the CBO were not included in their report). They developed an estimate of the total contract costs eligible for reimbursement through progress payments. The Grace Commission started with all fixed-price contracts awarded in 1982 (\$77.3 billion). The DoD IG started with contracts funded in Fiscal Year 1985 from procurement, construction, and operations and maintenance programs (\$141.4 billion). Detailed computations were shown in Exhibits 2 and 3.

Beginning with Fiscal Year 1984, DoD began collecting contract financing information through the DD Form 350 (Individual Contracting Action Report) management information system. A review of fixed-price contracts awarded in Fiscal Year 1984 disclosed that roughly \$56.7 billion of \$100 billion included progress payment provisions. This amount is considerably lower than the assumptions used by the Grace Commission and DoD IG. Other assumptions concerning cash outlays projected are reviewed below:

Grace Commission -

- All fixed-price contracts (excluding shipbuilding and construction) receive progress payments.
- All costs are incurred on the 1st day of the contract's 1st year; half of the deliveries are not made until the second year and the other half in the third year.

DoD IG -

- 85% of all procurement programs are acquired through fixed-price contracts, and all those contracts receive progress payments.
- All operations and maintenance contracts are fixed-price and receive progress payments.
- Shipbuilding and construction contracts, which receive progress payments under the percentage of completion method, would be affected by lowering the rates under the percentage of cost basis.
- Progress payment reductions could immediately be implemented on all contracts. The DoD IG report recognized this limitation but did not offer alternative outlay projections.

The net effect of these assumptions produced projections in cash outlay reductions that were overstated. Using the same basic reasoning process as the Grace Commission, outlay reductions (without considering price increases) should have been as follows:

**EXHIBIT 22**  
**BASELINE FOR OUTLAY PROJECTIONS**  
**FISCAL YEAR 1985**  
**(\$ BILLION)**

CONTRACTS CONTAINING PROGRESS PAYMENTS (1984)	\$56.7
AVERAGE MARKUP RATE FIXED PRICE CONTRACTS	<u>12.4%</u>
COSTS ELIGIBLE FOR PROGRESS PAYMENTS	\$50.4
1985 PROCUREMENT BUDGET INCREASE OVER 1984	<u>13.0%</u>
ESTIMATED 1985 COSTS ELIGIBLE	\$57.0

A 10% reduction in progress payments would be a contract financing payment reduction of \$5.7 billion and a corresponding delivery payment increase of \$5.7 billion. The effect on each year depends upon the timing of the contractor's cost incurrence and contract deliveries. Using the profiles developed in the analysis performed by the Office of the Under Secretary of Defense for Research and

Engineering in 1983, the outlay reductions and increases of \$5.7 billion for the contract awards in 1985 would be as follows:

**EXHIBIT 23  
OUTLAY CHANGES  
FISCAL YEAR 1985 CONTRACTS  
(\$ BILLION)**

	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>TOTAL</u>
REDUCED PROGRESS PAYMENTS	\$(.9)	\$(2.5)	\$(1.7)	\$(.6)	\$(5.7)
INCREASED DELIVERY PAYMENTS	_____	_____ .6	_____ 4.5	_____ .6	_____ (5.7)
NET OUTLAY CHANGE - 1985	\$(.9)	\$(1.9)	\$ 2.8	\$ 0	\$ 0
IF 1986 ADDED		( .9)	(1.9)	*	(2.8)
IF 1987 ADDED	_____	_____	_____ (.9)	_____ *	_____ (.9)
THREE YEAR TOTAL	\$(.9)	\$(2.8)	\$ 0		\$(3.7)

\* NOT INCLUDED IN GRACE COMMISSION'S OUTLAY ESTIMATE

As demonstrated above, eventually the delivery payments would offset the outlay reductions. The first year reduction (1985) is less than 50% of the DoD IG's published estimate of \$2.1 billion and, if amounts were accumulated for three years as done by the Grace Commission (shown above by including Fiscal Years 1986 and 1987), the total would be \$3.7 billion not \$9.4 billion. The \$3.7 billion would be higher or lower depending upon budget changes and mix of contracts in Fiscal Years 1986 and 1987. Furthermore, as will be discussed later, these amounts would be affected by price changes in contracts associated with contract financing changes.

**Interest Savings**

Assuming that there would be no contract price increase resulting from lowered progress payment rates, the Grace Commission estimated that interest savings would amount to \$1.7 billion over three years and the DoD IG estimated annual savings of \$250 million. The CBO and GAO believed that interest savings would be offset by price increases. As previously observed in the "typical" contract simulation, changing progress payments from 90% to 80% yielded an increase in financing costs at 12% commercial interest from 1.75% to 3.43% (as a percentage of total costs).

Interest savings from reduced progress payments would benefit the Treasury Department. The savings would be a function of the net change in cash flow at the Treasury Department's rate of interest. The amounts shown below in Exhibit 24 are the interest savings which would result with the outlay changes shown earlier in Exhibit 23. The assumed interest rate to the Treasury Department is 8%.

**EXHIBIT 24**  
**INTEREST SAVINGS ON OUTLAY REDUCTIONS**  
**FISCAL YEAR 1985 CONTRACTS**  
**(\$ MILLION)**

	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>TOTAL</u>
INTEREST SAVINGS AT 8%	\$ 36	\$150	\$114	\$ 0	\$301

The above amounts would be subject to the same changes in budget authority and contract mix as noted with outlay reductions, as well as changes in the interest rate. More importantly, however, the savings projections are subject to price increases in defense contracts. If contractor financing costs, incurred at a commercial interest rate equal to the Treasury Department's interest rate, were passed on to DoD, there would be a net financial detriment to the Government. In this example, DoD's costs would increase by \$301 million, and the Treasury Department's savings would be \$277 million for a net overall increase to the Government of \$24 million. This occurs because the increased delivery payments shown in Exhibit 23 would be further increased to absorb passed on financing costs. This is displayed in Exhibit 25 below. Furthermore, for every percentage point that the commercial interest rate is higher than the Treasury Department's borrowing rate, the costs to DoD become greater and savings to the Treasury Department smaller.

**EXHIBIT 25**  
**INTEREST SAVINGS ON OUTLAY REDUCTIONS**  
**WITH CONTRACT PRICE INCREASE**  
**FISCAL YEAR 1985**  
**(\$ MILLION)**

	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>TOTAL</u>
INTEREST SAVINGS AT 8%	\$ 36	\$ 150	\$ 114	\$ 0	\$ 301
PRICE INCREASE AT 8%		(30)	(241)	(30)	(301)
ADJUSTMENT TO INTEREST AT 8%		(2)	(20)	(2)	(24)
TOTAL GOVERNMENT SAVINGS	\$ 36	\$ 118	\$(147)	\$(32)	\$(24)

The emphasis on interest savings to the Treasury Department in support of criticisms of DoD's progress payment policies have not given adequate consideration to potential increases in contract prices. The rebuttal that contract price increases would not offset Treasury savings dollar-for-dollar does not fully recognize that: (1) commercial interest rates will be higher than the Treasury's and (2) total pass-on is not necessary to offset all Treasury savings. Furthermore, the issue should not be whether contracting officers can negotiate contract prices which ignore increased contractor financing costs. Instead, the issue is how much financing should contractors, as a DoD policy, be expected to absorb through profit.

### CONCLUSIONS

The DoD policies on contract financing have been examined under this project from both historical and quantitative perspectives. Although the foundations of the present policies were established in the early 1950's, there have been many changes in the direction taken by DoD over the years. These changes have been precipitated by a number of influences such as economic conditions, defense industrial base considerations, and improved cash management. However, some issues have remained fundamental to the policies on contract financing. These issues are recounted below along with other conclusions concerning progress payments.

#### 1. INTEREST ON WORKING CAPITAL SHOULD REMAIN UNALLOWABLE.

DoD has long recognized that interest expenses are an ordinary and necessary cost of doing business. However, it is not practical or prudent for DoD to recognize interest expense as an allowable contract cost. Such a policy would create a bias toward debt financing. There are also significant cost measurement problems because interest is not traceable to actual contract performance, as observed by the CAS Board. Finally, allowing interest would impede competition because "cash rich" or large, financially secure contractors would have a significant price advantage over smaller contractors.

#### 2. ALTERNATIVE METHODS SHOULD CONTINUE TO COMPENSATE CONTRACTORS FOR WORKING CAPITAL FINANCING.

The combination of progress payments and profit have been traditionally employed to compensate defense contractors for interest expenses. Progress payments reduced the contractor's need to furnish working capital and, therefore, reduced related financing costs. The contractor's costs incurred to finance the balance of working capital (e.g., not covered by progress payments) are considered to be part of the negotiated markup. There have been attempts by DoD in the past, although unsuccessful, to link explicitly these compensation mechanisms (e.g., Defense Procurement Circular 107 in 1972). The heightened awareness of the time value of money and other cash management concerns make it imperative to develop an explicit link between contract financing and profit.

3. HISTORICALLY, CONTRACTORS HAVE ABSORBED THROUGH PROFIT FINANCING COSTS EQUATING TO 2% OF TOTAL CONTRACT COSTS.

Using the Short Term Commercial Loan Rate as a measurement of interest costs, financing has normally absorbed profit equating to 2% of total contract costs. For two-thirds of the 31 years covering DoD's formal policy on progress payments, financing costs have fallen between 1.5% and 2.5% of total contract costs. Only three years exceeded 3% (1979-1981), and those were the years where it was considered necessary to raise the progress payment rate from 80% to 90%. Therefore, the baseline for considering policy alternatives should be 2%. If contractors will be expected to carry substantially more or less than this level of financing (e.g., less than 1.5% or more than 2.5%), then the profit policy should be revised accordingly.

4. OUTLAY REDUCTIONS AND INTEREST SAVINGS OF THE MAGNITUDE CITED BY THE GRACE COMMISSION, CBO, AND DOD IG WOULD NOT BE ACHIEVED.

The Grace Commission's prediction of outlay reductions and interest savings were overstated because of the assumptions used to derive their estimates. Compared to the Grace Commission, the amounts predicted by the DoD IG and CBO were conservative. The DoD IG gave no regard to the likely price increases that would result, while the CBO acknowledged the probability of price increases.

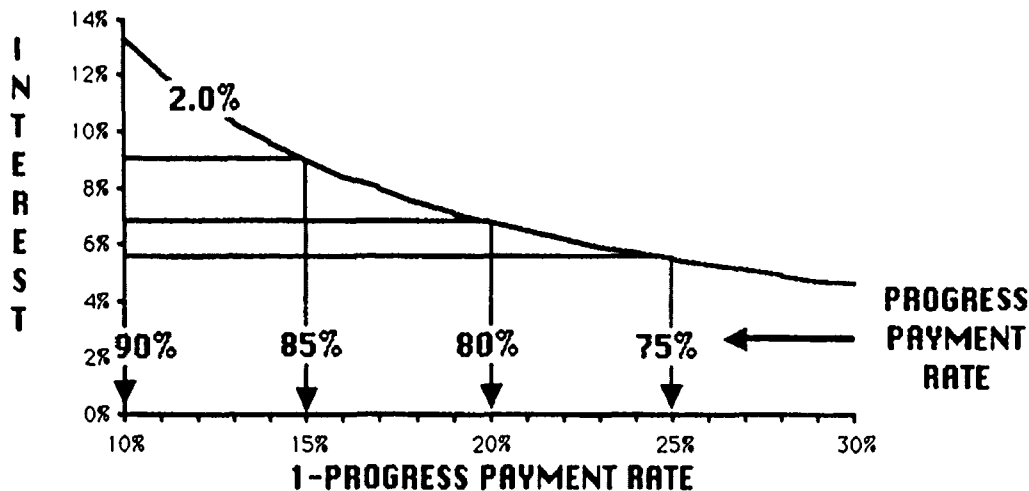
RECOMMENDATIONS

There is a pressing need to revise the DoD policies on progress payments in order to eliminate confusion over relationships between financing and profit. It is also necessary to make financing more responsive to economic conditions. Although the recommendations listed below are designed to accomplish this end, they must be integrated with changes in the profit policy.

1. SET REQUISITE LEVEL OF CONTRACTOR SUPPLIED FINANCING FOR WORKING CAPITAL AT 2% OF CONTRACT COSTS

This percentage was measured under a "typical" contract simulation analysis using the Short Term Commercial Loan Rate. Other interest rates which better depict contractor financing costs could be used instead (e.g., Prime Rate) and the 2% adjusted accordingly. It is essential, however, that any interest rate used be independently derived and formally published. The uniform standard progress payment rate should be a function of the expectations of future interest rates and the requisite level of contractor financing set at 2%. The function of these two variables is depicted in the indifference curve shown in Exhibit 26. This curve was derived from the "typical" contract and would change if variables such as paid cost float, Government payment delays, delivery schedule, or contract length were altered.

**EXHIBIT 26**  
**CONTRACTOR FINANCING COSTS**  
**INDIFFERENCE CURVE**  
**DELIVERY PAYMENT IN 30 DAYS**  
**(AS % OF TOTAL COST)**



**2. ESTABLISH MECHANISM FOR ADJUSTING MARKUP OBJECTIVES IN SITUATIONS WHICH VARY SUBSTANTIALLY FROM BASELINE EXPECTATIONS**

There must be a visible connection between the contract financing and profit policies. Markup objectives should change automatically if the conditions of a procurement differ significantly from the assumptions on which policy is based. Examples of these conditions are length of contract, different delivery schedule, and fluctuating interest rates.

**3. RETAIN PAYMENT POLICY OF 5 TO 10 DAYS FOR PROGRESS PAYMENTS**

Contract financing payments should continue to be paid as quickly as possible. As DoD policy, the payment period should normally be within 5 to 10 calendar days. Progress payments earlier than 5 days should not be permitted unless expressly specified in the contract with explicit consideration received by the Government. Progress payments later than 10 days may occur in cases where the administrative resources of the Government paying office are insufficient to make payment that quickly. The Flexible Progress Payments program is available to contractors to adjust for cases where progress payments would be significantly delayed.



#### **4. ESTABLISH PAYMENT POLICY OF 30 DAYS FOR DELIVERY (INVOICE) PAYMENTS**

The policies established by the Deputy Under Secretary of Defense for Acquisition Management on January 3, 1983 and incorporated into Defense Acquisition Circular 76-42 (Item I) should be rescinded. This would include revising the provisions in DoD Federal Acquisition Regulation Supplement 32.111. Unless otherwise provided in OMB Circular A-125, contracts should not incorporate payment terms earlier than 30 days. If earlier terms are incorporated, explicit consideration must be received by the Government.

#### **5. PROGRESS PAYMENT FREQUENCY SHOULD REMAIN ON A MONTHLY BASIS**

There are major advantages to the Government by retaining the monthly progress payment frequency. It eases the administrative burden on Government paying offices by reducing the volume of financing payments by 50%. It allows greater opportunity for avoiding interest penalties on delinquent delivery payments, which are required under the Prompt Payment Act. It also allows for more responsive action on monthly submission.

#### **6. REVISE PROGRESS PAYMENT RATES AS SHOWN BELOW**

Given a requisite level of contractor-supplied financing at 2% of total costs, and assuming a Short Term Commercial Loan Rate of 10%, the progress payment rates should be revised as follows:

	<u>Now</u>	<u>Revise to</u>
Large Businesses	80%	85%
Small Business	85%	90%
Large Business (FMS)	95%	85%
Small Business (FMS)	100%	90%
Flexible Progress Payment Investment Level	15%	15%
Maximum Flexible Progress Payment Rate	100%	100%

Other than the fact that FMS contracts are funded from different sources than U.S. Government contracts, there is little distinction in the financing requirements of each. If contract financing is to be linked more directly with the profit policy, then the financing level to borne by the contractor should be the same for U.S. and FMS contracts. The flexible progress payment requirements should be equated to requisite levels of financing under the typical contract.

## CHAPTER V

### CONTRACT MARKUP (PROFIT)

This chapter discusses both profits and markups. The DoD profit policy is really a markup policy, so it will be referred to as such in this chapter.

#### BACKGROUND

The markup policy of the Department of Defense has evolved over the past twenty-one years since the initial promulgation of a structured approach to developing markup objectives for negotiated contracts. This structured approach, known as the Weighted Guidelines (WGL), became effective on 1 January 1964. The WGL technique was based on the concept that markup should depend on the risk assumed by a contractor, the difficulty of the task, the amount of contract cost, the source of resources, contractor past performance and other factors. This was accomplished by the establishment of ranges of weights which were applied to estimated contract cost elements. The WGL was designed to provide a reasonably precise and consistent method of developing markup objectives tailored to the circumstances of each contract.

Over the years, many criticisms have been made of the WGL approach. The principal criticism was that the WGL overemphasized estimated contract cost and ignored contractor investment as a meaningful markup determinant. The perceived effect of such a policy was higher costs to DoD and less than optimum investment levels by defense contractors.

#### DPC 107

In an attempt to correct the perceived deficiencies in the WGL approach, in 1972 DoD issued Defense Procurement Circular (DPC) 107 on a test basis as a return-on-investment approach to establishing a markup objective. Although technical effort and contract risk were still considered, their importance was greatly reduced. Factors were added to base part of the markup objective on the amount of operating capital and facilities capital necessary to perform the contract. Operating capital was defined as accounts receivable plus inventory minus unliquidated progress payments and minus accounts payable to outside vendors. Facilities capital was defined as the net book value of land, buildings and equipment. The intent of DPC 107 was to compensate contractors directly for their use of capital.

DPC 107 was tested on a voluntary basis when requested by a contractor. It was eventually withdrawn in 1975 because contractors were not supportive of the new approach. They believed that contract markups would not increase as a result of using the DPC 107 technique, that the procedure was overly complex, and that it would penalize contractors with little capital investment.

After the withdrawal of DPC 107 in 1975, DoD began a major study of defense markups and their relationship to capital investment. (4) Known as

Profit '76, the study was initiated to determine policy changes necessary to achieve proper facility investment levels and associated reductions in cost.

### DPC 76-3

The revised policy resulting from Profit '76 recommendations was promulgated in DPC 76-3 and became effective on 1 October 1976. The primary changes made to markup policy were that:

- o the imputed cost of capital for facilities investment (measured in accordance with Cost Accounting Standard (CAS) 414) became an allowable cost on most negotiated contracts priced on the basis of cost analysis;
- o the level of facilities investment was recognized in establishing a pre-negotiation markup objective and assigned a weight from 6% to 10%;
- o estimated contract cost received less emphasis through the use of a 30% reduction factor (this factor was designed to eliminate any increase in average markups resulting from the two changes described above);
- o a greater spread in weights was established to recognize the difference in risk between cost reimbursable and fixed-price contracts;
- o productivity improvements were introduced as a modest markup factor; and
- o past performance and special markup factors were deleted.

The policy revisions were designed to reward contractors with larger amounts of facilities capital, and to penalize those with smaller amounts of facilities capital. It was expected that average markup levels would not change after the implementation of policy revisions, assuming that:

- o the mix of firm-fixed-price (FFP), fixed-price-incentive (FPI), cost-plus-incentive-fee (CPIF) and cost-plus-fixed-fee (CPFF) contracts would remain the same after the markup policy changes as it was in 1975;
- o the cost of capital rate which is published by the Secretary of the Treasury on a semi-annual basis in accordance with Public Law 94-21 would remain the same as the 1971 to 1976 average rate of 8%; and
- o facilities capital allocated to contracts would remain the same percentage of contract costs as indicated by the Profit '76 survey of defense contractors.

Changes in the mix of contract type or in interest rates were considered to be independent of this change in markup policy. If, however, the change in policy was effective in removing obstacles to cost-reducing facilities investment, additional amounts of facilities capital would be allocated to contracts, contract costs would be reduced due to increased efficiencies, and markups expressed as a percentage of costs would increase.

A key element of the revised policy was the treatment of CAS 414, "Cost of Money as an Element of the Cost of Facilities Capital," which became effective on 1 Oct 1976. CAS 414 provided a technique for measuring the cost of capital for contractor-owned facilities and allocating this cost to individual contracts. DPC 76-3 established a new cost principle to recognize this imputed interest cost as an allowable cost on DoD contracts. Formerly, this element of cost was implicitly included as a part of the markup objective.

The promulgation of CAS 414 created some controversy within the Government, where the belief was held that the cost of money as an element of the cost of capital committed to facilities should remain a consideration in determining markup rather than being treated as a contract cost. The Cost Accounting Standards Board, however, stated that: (25)

The Standard is intended to improve contract cost measurement and understanding by the contracting parties and to provide for greater uniformity by specifying techniques appropriate to types of circumstances actually encountered. Capital asset commitment varies widely among contracts. The Board has developed a technique that takes explicit account of such differences in capital intensity.

Concerns expressed that CAS 414 might result in reduced contract markup levels were dismissed by the CAS Board as demonstrating a misunderstanding of the Board's mission:

This standard need have no impact in the aggregate prices paid by the Government but will reflect specific identifiable cost of money as an element of the cost of facilities capital in individual negotiated contracts. Previously, these costs presumably were reflected in nonidentifiable amounts in the profits or fees included in the total contract prices. By reflecting specific costs of money attributable to contractor investments in facilities, this Standard will provide for greater consistency in negotiating total contract prices. The Board understands that procurement agencies expect to take this Standard into account in their current reconsideration of pricing policies.

Congress was also concerned with possible consequences of treating CAS 414 as an allowable cost. In a 27 May 1976 letter to the Secretary of Defense, Senator William Proxmire stated: (26)

I am concerned that, if such a revision (to the WGL) is not made, the guidelines will not take account of CAS 414 in a way which results in an appropriate reduction in profits. Such a reduction is essential...

DoD chose to integrate CAS 414 into its pricing policy by allowing facilities capital cost of money as a cost and eliminating any recognition of it in the development of a markup objective. This elimination was accomplished through the use of an adjustment factor to reduce the markup amount for the contractor input to total performance (CITP) section of the WGL. Since facilities capital employed (FCE) was introduced as a markup factor at the same time, the offset was structured to adjust for both CAS 414 impacts and FCE changes so that, in the aggregate, markup objectives would not increase as a result of DPC 76-3 changes. Thus, a 30% reduction to the CITP markup objective was incorporated into the WGL policy. The initial markup factors on facilities capital was modest and was expected to be adjusted as further experience with the policy was gained.

#### DAC 76-23

DoD revised the markup policy in February 1980 in Defense Acquisition Circular (DAC) 76-23. This revision made three major changes. First, the weight range for facilities capital investment was increased to 16-20% (from 6-10%). That change was designed to increase this factor's percentage of total markup objective from 10% to 17% and thereby provide a more positive motivation for contractors to increase their facilities investment. Second, new Weighted Guidelines for labor intensive R&D contracts and service contracts were added with separate weight ranges for CITP and risk factors, no allowance for facilities capital investment, and a dollar-for-dollar cost of money offset instead of the 30% reduction factor used for manufacturing contracts. Third, risk factors were adjusted downward for CPFF contracts and separate factors were reinstated for cost and multiple incentive CPIF and FPI contracts.

#### CRITICISMS AND CONCERNS

Within the defense community as well as outside it, DoD's markup policy has been subjected to scrutiny and criticism. Current criticisms range from indictments of the basic principles on which the policy is based to attempts to improve relatively minor details within the policy framework. A brief description of the more significant criticisms is presented here.

#### Renegotiation

Renegotiation, under the 1951 Renegotiation Act, was a procedure to identify and recover excess profits earned on individual defense contracts. Congress allowed the Renegotiation Act to expire due to evidence that it imposed a costly administrative burden on reporting firms, tended to direct its efforts toward smaller contractors, and was no longer needed. Legislation is periodically proposed to reinstate renegotiation, usually with some consideration given to minimizing administrative costs.

The DoD position has been that the best approach to avoiding excess profits is good pricing. Given an adequate number of well-trained contracting officers with supporting field auditors and pricing personnel, and with the

protection provided by the Truth in Negotiations Act and fraud statutes, there is no reason why excess profits should be a significant problem. Cost accounting standards have superseded the allocation disputes which were the heart of many of the Renegotiation Board's findings of excess profits. Finally, good pricing has the advantage of encouraging cost control, because a contractor must underrun tight costs to earn a high profit. The renegotiation approach, on the other hand, would tend to encourage contractors to attempt to increase costs on profitable contracts, rather than to cut costs still further.

Renegotiation might be a cost-effective approach if overpricing were pervasive; otherwise, the arguments in favor of good pricing and case-by-case defective pricing procedures appear conclusive. The evidence available to DFAIR which would indicate whether pervasive overpricing exists is a comparison of negotiated markup to earned profit. If earned profits have been significantly higher than negotiated markups, this could point to an overpricing problem. If this comparison shows that earned profits have been conforming to the negotiated results, but are still too high, the solution would not be renegotiation but a change in markup policy.

DFAIR found aggregate earned profit margins to be consistently lower than aggregate WGL expectations. The one noteworthy exception to the trend of below-expectation profit margins is in the shipbuilding industry; even there, profits are higher than expected only on cost-type contracts. These results, discussed at more length later in this chapter, support the DoD position that renegotiation is not needed.

### Criticisms of DPC 76-3

On 8 March 1979, the General Accounting Office (GAO) issued a report entitled "Recent Changes in the Defense Department's Profit Policy--Intended Results Not Achieved" which concluded that the new markup policy had resulted in higher negotiated markups with no demonstrable reduction in costs, and little indication that contractors had increased their level of capital investment. (27) To increase the likelihood that the new policy would motivate contractors to invest in cost-reducing facilities and to improve upon its implementation, the GAO recommended:

- o a substantial increase in emphasis on facilities capital investment;
- o a further reduction in that portion of the markup objective that is based on estimated contract cost;
- o a more detailed analysis of the impact of the new policy on overall negotiated markup rates;
- o the establishment of more definitive criteria and procedures for contracting officers' use;
- o the development of safeguards to prevent negotiating markups significantly higher than objectives without adequate justification; and

- o the monitoring of policy implementation to provide assurance that the desired results were being achieved.

### **Defense Industrial Base Hearings**

On 17 September 1980, the Committee on Armed Services of the House of Representatives began a series of hearings on the capability of the U. S. defense industrial base to produce the military equipment needed to insure the national security. These hearings were prompted by a concern that industrial productivity had declined in relation to foreign competition, that there was increasing dependence on foreign sources for critical materials, that manpower shortages were prevalent and that weapon systems costs were increasing at an alarming rate.

A panel was established to continue study of the problem and to report its findings and recommendations to the full committee. Hearings held by the panel portrayed the industrial base as crippled by declining productivity growth, aging facilities and machinery, shortages in critical materials, increasing lead times, skilled labor shortages, inflexible government contracting procedures, inadequate defense budgets and burdensome government regulations and paperwork.

One of the major findings of the panel was that " . . . current tax and profit policies appear to discourage capital investment in new facilities and equipment that would increase productivity and improve the condition of the defense industrial base." Another significant finding was that " . . . productivity growth rates for the manufacturing sector of the U.S. economy are the lowest among all free world industrialized nations; the productivity growth rate of the defense sector is lower than the overall manufacturing sector; and the means for capital investment in new technology, facilities and machinery have been constrained by inflation, unfavorable tax policies, and management priorities." (2) These problems were attributed to the decline in the procurement and R&D budgets after the Vietnam conflict which restrained new investment in defense related work--profits within the defense base generally did not sustain new investments. This problem was compounded by high inflation and high interest rates which further discouraged investment in new facilities and equipment.

The panel recommended that legislation be considered to provide that contracting, where practicable, should provide incentives to defense contractors to make economic purchases of material and to improve productivity by investment in technology, capital facilities and equipment. The Committee on Armed Services was asked to direct its attention to problems such as profit policy and the management and investment practices of defense contractors.

### **Profit Study '82**

In 1982, the Air Force Systems Command (AFSC) conducted a study entitled Profit Study '82 to measure the success of DPC 76-3 and DAC 76-23 in meeting

policy goals. (28) The markup data which Profit Study '82 relied upon was limited; most of its conclusions were drawn from AFSC DD Forms 1499 (Report of Individual Contract Profit Plan). Two of Profit Study '82's findings were particularly important in their implications for DoD's markup policy:

- o Finding 3: The markup policy changes under DAC 76-23 significantly reduced the potential impact of markup on capital investment.
- o Finding 6: Recognition of capital employed markup has not motivated contractor investment.

The DoD-wide markup data which was available for DFAIR analysis provides a picture of the results of DAC 76-23 which contradicts Finding 3. Exhibit 1 sets forth the pre-DAC 76-23 distribution of markup objectives, the redistribution intended by DAC 76-23, the distribution found in the AFSC sample and the DoD-wide distribution found by DFAIR. Exhibit 1 shows that DAC 76-23 clearly succeeded in reducing the markup objective assigned to cost input and risk, and increasing the markup assigned to capital employed.

**EXHIBIT 1**  
**DISTRIBUTION OF PROFIT FACTORS, AFSC VS. DOD-WIDE**

<u>Factor</u>	Pre-DAC 76-23 (FY 77)	DAC 76-23 Goal	FY 81 AFSC	FY 81 DoD
Cost Input and Risk	93%	83%	91%	84%
Capital Employed	7%	17%	9%	16%

(Factors are expressed as percentages of total markup objectives.)

Sources: DD Form 1499 Data Base  
Profit Study '82  
DAC 76-23

Finding 6 was based primarily on an analysis of trends in direct labor and capital employed. Profit Study '82 assumed that if contractors had made cost-reducing investments, then direct labor costs would decrease as a percentage of total costs, and facilities capital employed would increase. This effect did not occur in FY 81, whether AFSC or DoD-wide data is examined. FY 81, however, was the first full year following DAC 76-23 changes, and it is reasonable to expect some delay in seeing the effects of investment. Looking at FY 82 and FY 83, DFAIR noted that a drop in direct labor did occur, and that capital employed did rise:



**EXHIBIT 2**  
**DIRECT LABOR AND CAPITAL EMPLOYED AS A % OF COST**

	<u>Direct Labor</u>	<u>Capital Employed</u>
FY 77	20.3%	9.7%
FY 81	20.7%	11.0%
FY 82	16.9%	9.9%
FY 83	17.7%	10.8%

Source: DD Form 1499 Data Base

Since the DD Form 1499 reports are a limited sample of the universe of negotiated contract actions, the above should only be reviewed as partial evidence of the desired capital/labor substitutions. Significant contractor investment has occurred, but evidence indicates that other events, in addition to DoD's recognition of capital employed as a markup factor, influenced contractors to invest. This issue is discussed in greater detail in Chapter VI, Capital Investment.

Because DFAIR's DoD-wide data consistently differed from the AFSC sample, the Profit Study '82 recommendations based on AFSC data are not specifically addressed by this report.

**President's Private Sector Survey on Cost Control (PPSSCC)**

The PPSSCC (Grace Commission), relying in part on information from Profit Study '82 and GAO's report "Recent Changes in Defense Department's Profit Policy--Intended Results Not Achieved", concluded that: (15)

- o DPC 76-3 and DAC 76-23 have not succeeded in increasing levels of capital investment within the defense industry in order to achieve the long-range goal of increased productivity.
- o Defense contractors have reached parity with FTC durable goods producers in return on sales, while maintaining better than parity financing capability due to government contract financing policies.
- o DoD contract pricing, profit and financing policies form an integrated system and should be reviewed as such rather than piecemeal.
- o DoD contract pricing, markup, and financing policies should be managed through an integrated data base management information system.
- o Using a current interest rate to impute a facilities capital cost of money charge is impractical and does not accurately reflect cost of money for previously purchased assets. An average interest rate should be based on depreciation schedules for already purchased capital assets.

Based on these conclusions, the PPSSCC recommended that DoD:

- o Perform an acquisition policy study that looks at contract pricing, markup and financing policies on a total basis. Every effort should be made to simplify policies and allow free enterprise attitudes to be realized.
- o Establish an integrated data base management system for acquisition policy analysis.
- o Scale back progress payment rates.

The first recommendation was influential in the establishment of the DFAIR study group. The third recommendation was implemented, with consequences discussed in Chapter IV, Contract Financing.

#### CAS 414 and DoD Profit Policy

GAO was asked by the Subcommittee on Defense and the Subcommittee on Legislative Affairs of the Committee on Appropriations, House of Representatives, to determine whether CAS 414, Facilities Capital Cost of Money, induces investment in cost reducing facilities, has continued relevance in light of current pricing and profit policies, or results in "double dipping."

Their study has not yet been completed, but preliminary findings are available on two of the issues. The GAO believes that CAS 414 has continued relevance and does not result in "double dipping" because of steps taken by DoD in their design of the profit policy. Analysis described later in this chapter confirms this belief.

One other aspect of CAS 414 which has been criticized is that it treats all facilities capital identically. Some critics advocate imputing interest expense only on "productive" assets or, alternatively, assigning different weights to assets with varying productivity levels.

The DFAIR found that CAS 414 cost of money, which identifies explicitly the "risk-free" opportunity cost associated with facilities capital, on average constitutes a small portion of negotiated markups (offset by a reduction in CITP). It is administratively impractical to develop "productivity gradients" among assets for purposes of determining those assets which should be granted CAS 414 cost of money coverage. The pursuit of such an approach would not be a cost effective or equitable application of CAS 414.

Some differentiation between the productivity and risk characteristics of classes of assets could be recognized in the preference weightings available for use in the Weighted Guidelines, such as providing no weight on land, medium weight on buildings and the highest weight on equipment. If this approach proves inadequate towards motivating productivity enhancing investment, the more direct IMIP approach could be pursued.

### The Boxer Bill

The Boxer Bill, introduced on 29 Jan 1985, proposes elimination of cost of money as an allowable cost. Congresswoman Boxer characterizes CAS 414 as "profit padding" and as "a reward for using the funds for defense contracting rather than in some other business even if there are no direct financing costs incurred."

DoD has chosen to reimburse contractors for imputed interest instead of incurred interest because of the long standing policy of impartiality to contractors' debt/equity decisions. Allowing incurred interest as a contract cost would introduce a bias toward debt financing. DoD is also understandably reluctant to reimburse premium interest rates for financially insecure contractors. Because the expense incurred to finance acquisition of fixed assets, whether debt or equity is used, is a real economic cost, it is not accurate to categorize cost of money as "profit padding" or as a reward for devoting effort to defense contracting.

### Senate Bill 1029

A current Senate bill addresses defense markup policies. Section 903 of Senate Bill 1029, dated April 29, 1985, requires the Secretary of Defense to report on the desirability of continuing to permit defense contractors to earn profit on general and administrative (G&A) expenses in defense contracts.

The current markup policy allows a 6-8% markup on G&A costs (which is reduced to 4.2-5.6% on manufacturing contracts after the 30% offset factor is considered) and applies a 0-8% markup for risk to the G&A portion of total estimated costs. Approximately .7 percentage points of total markup (plus cost of money) were attributable to G&A in FY 83.

An argument can be made for excluding G&A from the markup base. If excluded, any incentive provided by the markup policy for a contractor to increase G&A costs would be removed. Additionally, one way of reducing markups by the .5 to 1 % of unintended increase resulting from DAC 76-23 would be to exclude G&A from the markup base. This type of exclusion would also serve to reduce the cost-based portion of the markup policy.

### ANALYSIS OF DOD MARKUP POLICY

DFAIR performed a number of separate analyses to determine how the markup policies have been applied by DoD contracting officers, and to determine the attitudes and perceptions regarding the markup policy held by DoD contracting officers. The results follow:

### Personnel Opinion Survey Views

As part of the DoD personnel opinion survey, responses were solicited on a number of markup issues. In general, the procurement personnel surveyed agree that markup policies and practices are adequately integrated with pricing issues, but disagree that contract financing and capital investment are adequately integrated. Individuals in the highest grades and positions are most likely to perceive shortcomings in the current policies. In analyzing responses, it is obvious that there is no consensus on the causes of perceived shortcomings or on possible changes to improve policies.

Procurement personnel surveyed acknowledged deficiencies in the current policies as follows:

	<u>Agree</u>	<u>Neutral</u>	<u>Disagree</u>
--Q.17. Current DoD PROFIT policies and practices contribute to:			
b. Efficient contractor performance.	22%	28%	50%
d. The lowest possible cost to the Government.	19%	25%	55%
e. Encouraging capital investment.	16%	34%	50%
--Q.25. The cost-based method of determining profit:			
b. Discourages the development of new efficiencies.	54%	21%	24%
c. Tends to increase defense contract costs.	52%	29%	20%
Many respondents were particularly critical of the effectiveness of the WGL:			
--Q.30. The Weighted Guidelines (WGL)			
a. Are used more as a crutch to justify the final negotiated price than as a tool to develop an appropriate profit objective.	50%	12%	39%
--Q.32. Regardless of WGL, contractors are out for a specific return on each contract.	91%	5%	4%
--Q.34. The Government profit/fee objective is often dictated by management, regardless of the WGL computation.	55%	12%	33%

A plurality (47%) of procurement personnel agree that the WGL should not be eliminated (Q.30e). One area that most respondents do agree on is the need for simplification, as indicated in their responses to the following:

	<u>Agree</u>	<u>Neutral</u>	<u>Disagree</u>
--Q.24. The method for offsetting facilities capital cost of money should be simplified.	69%	24%	7%
--Q.29. DoD could develop a two-tiered profit methodology to explicitly recognize the time-phased contractor investment in a contract (i.e., costs less government provided financing) on very large contracts.			
a. This would be an effective approach.	52%	35%	14%
b. This approach would be administratively practical.	37%	42%	21%

In light of such strong sentiment, it should not be surprising that a majority of respondents (61%) agreed that DoD should substantially revise its profit policies (Q.19). Despite this agreement, however, there was little agreement on what types of changes should be made. The following possibilities were proposed, but respondents rejected them:

	<u>Agree</u>	<u>Neutral</u>	<u>Disagree</u>
--Q.26. For manufacturing contracts, profit objectives should be based entirely on capital investment and risk.	32%	20%	49%
--Q.27. Profit should be based primarily on the return-on-investment concept.	30%	28%	41%
--Q.35. The weight ranges currently allowed in the WGL for contractor risk are too high.	6%	29%	65%
--Q.51. The present capital employed factor (16-20%) is too small to provide a tangible incentive for investment.	25%	39%	36%

Procurement personnel do not believe that defense contractor profits are too low:

--Q.20. Profits realized by defense contractors are too low:

	<u>Agree</u>	<u>Neutral</u>	<u>Disagree</u>
a. As measured as a percentage of the selling price.	26%	25%	49%
b. As measured by return-on-investment.	26%	24%	50%

#### Comparison with Profit '76 Responses

Many of the items included in the personnel survey were also included in the Profit '76 personnel survey. Items were repeated so that any change in attitude which may have resulted from DPC 76-3 policy revisions could be identified. Because of methodological differences in survey techniques, care should be exercised in drawing any conclusions from the comparisons.

A is Agree  
N is Neutral  
D is Disagree

	<u>DFAIR</u>			<u>PROFIT '76</u>		
	<u>A</u>	<u>N</u>	<u>D</u>	<u>A</u>	<u>N</u>	<u>D</u>
--Q.19. DoD should substantially revise its profit policies.	61%	24%	16%	53%	20%	26%
--Q.20. Profits realized by contractors are too low:	-	-	-	26%	32%	40%
a. As measured as a percentage of the selling price	26%	25%	49%			
b. As measured by return-on-investment.	26%	24%	50%			
--Q.21. There is little direct relationship between quality or performance of product and levels of profit.	64%	12%	24%	50%	11%	37%
--Q.22. The system puts a lot of pressure on contracting officers to keep profits down.	75%	11%	14%	59%	13%	26%
--Q.23. Profit should be allowed on escalation under economic price adjustment clauses.	24%	17%	59%	32%	9%	57%
--Q.28. The weight ranges in the contractor input-to-performance (CITP) section of the WGL do not properly reflect	42%	40%	18%	40%	21%	36%

	DFAIR			PROFIT '76		
	<u>A</u>	<u>N</u>	<u>D</u>	<u>A</u>	<u>N</u>	<u>D</u>

the contribution of the various cost elements to contract performance.

--Q.30. The Weighted Guidelines (WGL):

a. Are used more as a crutch to justify the final negotiated price than as a tool to develop an appropriate profit objective.	50%	12%	39%	45%	8	46%
b. Tend to depress negotiated contractor profits.	43%	20%	37%	25%	17%	56%
c. Approach is sufficiently flexible to provide adequate profits to the majority of contractors.	48%	19%	33%	67%	7%	23%

--Q.32. Regardless of WGL, contractors are out for a specific profit return on each contract.	91%	5%	4%	75%	9%	15%
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LMI Analysis

The Logistics Management Institute (LMI) analyzed 5,434 DD Forms 1499 in order to examine the role played by facilities capital in determining contract markup. Using multiple regression analysis techniques, LMI found that:

- o One intent of the revised Weighted Guidelines was to create more widely dispersed markup outcomes. However, there is relatively little variability in markup rates, despite a great deal of variability in the cost makeup and other characteristics of individual contracts. This is because the WGL permit enough flexibility in implementation to neutralize some of the intent of the policy.
- o The WGL are not the single determinant of markup. The WGL method explains 77% of the variation observed in manufacturing contract markup objectives and 57% of the variation in negotiated markup rates.
- o Contract type is always a significant determinant of markup rates.
- o The markup objective is a reasonable predictor of negotiated markup rates.
- o The amount of facilities capital is a significant determinant of markup rates, as the policy intended. Manufacturing contracts with greater than average amounts of facilities capital were awarded higher than average markup rates.

LMI's recommendation to insure that DoD realizes its intent of creating more widely dispersed markup outcomes through the use of WGL is to narrow the weight ranges currently allowed.

### Trends in Proposed, Objective, and Negotiated Markup

DFAIR assessed the extent to which markup policy is followed by analyzing more than 11,000 DD Forms 1499, which record contracting officers' negotiation objectives in detail. With few exceptions, this analysis confirms that markup objectives were developed in accordance with markup policy, and in the aggregate they track closely with negotiated results.

Exhibit 3 compares objective markup rates with negotiated and proposed markups for FY 77 to FY 83.

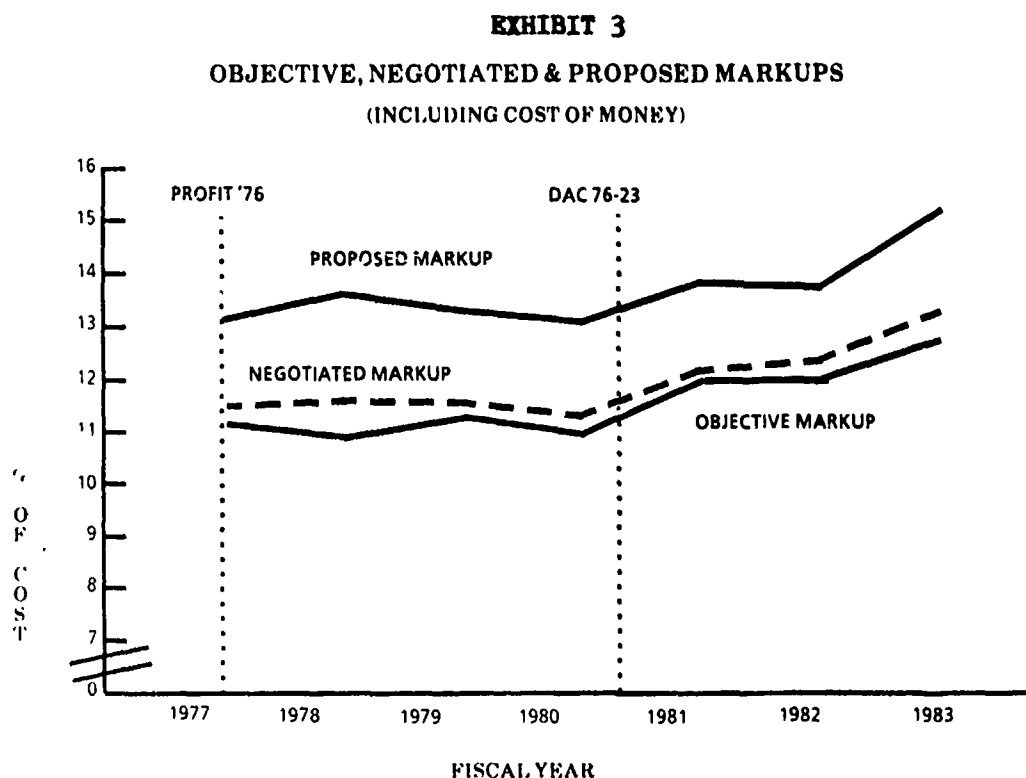


Exhibit 4 shows markup objectives since FY75. Exhibit 5 summarizes the changes made to markup policy by DPC 76-3 and DAC 76-23. These exhibits are followed by a discussion of the extent to which markup increases are attributable to the elements of the markup policy changes made by DPC 76-3 and DAC 76-23.



**EXHIBIT 4**  
**DOD MARKUP OBJECTIVE RATES**  
**(CONTRACTS WHICH USED WEIGHTED GUIDELINES)**

WEIGHTED GUIDELINES	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
PROFIT FACTORS									
EFFORT (CONSIDERS OFFSET)									
RISK		5.80%	4.15%	4.24%	4.45%	4.34%	4.53%	4.38%	4.24%
PROFIT ON INVESTMENT		3.48	5.10	4.91	5.09	4.59	4.30	4.43	5.03
PAST PERFORMANCE		--	.73	.68	.67	.92	1.70	1.61	1.80
SPECIAL PROFIT		.83	--	--	--	--	--	--	--
INDEPENDENT DEVELOPMENT		.38	--	--	--	--	--	--	--
SOURCE OF RESOURCES		--	.08	.05	.11	.12	.02	.02	.03
OTHER		-.06	--	--	--	--	--	--	--
SUBTOTAL	9.80%	10.43%	10.46%	10.28%	10.58%	10.16%	10.68%	10.61%	11.17%
COST OF MONEY	--	--	.77	.70	.78	.90	1.36	1.45	1.59
TOTAL	9.80%	10.43%	11.23%	10.98%	11.37%	11.06%	12.04%	12.06%	12.76%

Source: DD Form 1499 Data Base.

**EXHIBIT 5**  
**SUMMARY MARKUP POLICY CHANGES**

Weighted Guidelines Markup Objective	Before Profit '76		DPC 76-3		DAC 76-23	
	All Contracts		All Contracts		Manufacturing	R&D Services
Contractor Effort: (1)						
Direct Materials:						
Purchased Parts	1 to 4%	Unchanged	Unchanged	Unchanged	Unchanged	Unchanged
Subcontracts	1 to 5%	"	"	"	"	"
Other Materials	1 to 4%	"	"	"	"	"
Engineering Labor	9 to 15%	"	"	"	"	N/A
Engineering Overhead	6 to 9%	"	"	"	"	N/A
Manufacturing Labor	5 to 9%	"	"	"	"	N/A
Manufacturing Overhead	4 to 7%	"	"	"	"	N/A
Services Labor	N/A	N/A	N/A	N/A	N/A	5 to 15%
Services Overhead	N/A	N/A	N/A	N/A	N/A	4 to 8%
G&A Expense	6 to 8%	Unchanged	Unchanged	Unchanged	Unchanged	Unchanged
Adjustment Factor Deduction	N/A	(30% of effort)	(30% of effort)	(30% of effort)	N/A	N/A
Contractor Risk (2)	0 to 7%	0 to 8%	0 to 8%	0 to 8%	0 to 7%	0 to 4%
Facilities Investment (3)	N/A	6 to 10%	6 to 10%	16 to 20%	N/A	N/A
Record of Performance (2)	-2 to 2%	Eliminated	Eliminated	Eliminated	Eliminated	Eliminated
Selected Factors (2)	-2 to 2%	Eliminated	Eliminated	Eliminated	Eliminated	Eliminated
Special Factors:						
Foreign Military Sales (2)	1 to 4%	1 to 4%	1 to 4%	(7)	(7)	(7)
Independent Development (4)	1 to 4%	1 to 4%	1 to 4%	1 to 4%	1 to 4%	N/A
Productivity (5)	N/A	*	*	*	N/A	N/A
Other (6)	N/A	-5 to 5%	-5 to 5%	-5 to 5%	-5 to 5%	-5 to 5%
Cost of Money Adjustment	N/A				(Total)	(Total)

- (1) Contractor effort weights are applied to the amount of cost associated with each cost element.
- (2) Applied to total estimated cost.
- (3) Applied to "facilities capital employed"; the facilities capital allocated to the contract.
- (4) Applied to recognized cost.
- (5) The cost decrease multiplied by the base markup rate.
- (6) Applied to the "basic profit objective", markup before special factors. "Other" did not introduce new factors; it moved them from "selected factors" and lowered the markup available for them by applying a weight to a base smaller than "Total cost".
- (7) FMS special factor was eliminated shortly after DPC 76-3.

### Effects of DPC 76-3

The effects of DPC 76-3 have been measured against the base year FY 75, because FY 75 was the year used by Profit '76 in determining the offset.

Markup policy analysis is performed using markup data prepared by contracting officers for their prenegotiation objectives. The markup objectives reported by the DoD Comptroller for base year FY 75 are set forth in Exhibit 6.

#### EXHIBIT 6 MARKUP OBJECTIVES ON DOD CONTRACTS, FY 75

	<u>FFP</u>	<u>FPI</u>	<u>CPIF</u>	<u>CPFF</u>	<u>Weighted Average</u>
CITP	5.5%	6.3%	7.2%	8.0%	6.7%
Risk	5.8	3.2	1.3	0.1	2.7
Past Performance	0.5	1.0	0	0	0.4
Total	11.8%	10.5%	8.5%	8.1%	9.8%
Distribution (Cost)	27%	25%	28%	20%	100%

Source: DD Form 1499 Data Base

Exhibit 7 uses the FY 75 weighted average objective as a base to show changes in markup objectives in FY 77-79.

DPC 76-3 made changes to the weight ranges for risk, and risk markup is also affected by changes in the distribution of contract types. To measure the change in markup factors due to increased weight ranges, the distribution of contract types was held constant. To measure the effects of changes in distribution of contract types, markup factors for each type were held constant. The combined variance was allocated proportionally. This standard/variance analysis is also used to study the effects of DAC 76-23.

**EXHIBIT 7**  
**MARKUP OBJECTIVE COMPARISON OF FY 77-79 (POST DPC 76-3; PRE-DAC 76-23)**  
**WITH BASE YEAR FY 75**

	Objectives FY 75	Differences from FY 75 Baseline				Average Objectives FY 77-79
		FY 77	FY 78	FY 79	Average FY 77-79	
CITP	6.7%	(0.8)	(0.7)	(0.3)	(0.6)	6.1%
Less 30% Offset	N/A	(1.8)	(1.8)	(1.9)	(1.8)	(1.8)
Risk	2.7	2.4	2.2	2.4	2.4	5.1
Weight Applied	-	0.9	0.7	1.0	0.9	-
Dist. Contract Types	-	1.5	1.5	1.4	1.5	-
FCE	N/A	0.7	0.7	0.7	0.7	0.7
Past Performance	0.4	(0.4)	(0.4)	(0.4)	(0.4)	-
Special Factors	0	0.5	0.5	0.4	0.5	0.5
COM, Baseline 8%	N/A	0.8	0.7	0.7	0.7	0.7
Treasury Rate Changes	N/A	0	0	0.1	0.1	0.1
Total Differences		1.4%	1.2%	1.7%	1.5%	
Total Mark Up Objectives	9.8%	11.2%	11.0%	11.4%	11.3%	11.3%

Note: Columns may not add due to rounding.

Source: DD Form 1499 Data Base

Exhibit 7 shows that markups increased by 1.5% between FY 75 and the average for FY 77-79. The most important single factor, by itself increasing average markup by 1.5%, is the "distribution of contract types" part of "Risk." The markup increase for this factor is caused by use of a higher percentage of fixed-price contracts, which are riskier and therefore are assigned higher markups by DoD contracting officers. This increase would have occurred even if DPC 76-3 had never been implemented.

CITP is another factor which is independent of DPC 76-3. It changes as the components of contractor effort, such as direct labor and material, increase or decrease as a proportion of total contractor effort. Within CITP, labor has a higher markup weight range than material, so if contractors increase material cost and reduce labor by issuing more subcontracts, markup will decrease. Changes of this nature decreased markups by an average of .6%.

These two factors, an increase of 1.5% and a decrease of .6%, produced a net increase of .9% which was not caused by DPC 76-3.

Exhibit 7 also shows that DoD's offset factor of 30% of CITP was more than sufficient to insure that markups did not increase as a result of cost of money (COM) and FCE. The 30% offset reduced markup by 1.8%, and COM and FCE together added back only 1.4%. Thus, the offset actually reduced markup by 0.4% more than expected.

The three remaining factors; the "weight" component of "Risk", Special Factors/Past Performance, and Treasury Rate changes, contributed a net increase of 1.1%:

- o Increased Weight for Risk. The fixed-price weights for risk were increased by DPC 76-3, in order to extend the range between cost and fixed-price type contracts. This change caused 0.9% increase.
- o Special Factors/Past Performance. Special factors were not changed by DPC 76-3, and yet the assigned markup increased from an amount so small it disappeared in rounding in FY 75 to 0.5% in FY 77-79. It is likely that this was due to DPC 76-3, but the cause/effect relationship is not clear. Possibly it was a means used by contracting officers to enhance markups on research and development (R&D) and service contracts, which may have seemed unreasonably low. Some confirmation of this occurs after DAC 76-23, which apparently corrected this imbalance since special factors then dropped back to insignificance. Past performance, deleted from the WGL by DPC 76-3. Reducing markups by .4%. The net increase in special factors markup was 0.1%.
- o Treasury Rate Changes. The treasury rate increased during the period, contributing an additional 0.1% to markup.

In summary, the most important influence on markups in the period 1977-1979 was not DPC 76-3, but the increased use of fixed-price contracts. This change accounted for an increase of 1.5% in markup objectives. DFAIR concludes that in the absence of DPC 76-3's introduction of cost of money and FCE markup, average markups would have been the same or higher.

### Effects of DAC 76-23

Exhibit 8 shows changes in markups in three years following DAC 76-23, FY 81-83. FY 80 is omitted because it is a transitional year which includes both pre- and post- DAC 76-23 negotiation objectives.

#### **EXHIBIT 8 MARKUP OBJECTIVE COMPARISON OF FY 81-83 (POST DAC 76-23) WITH DPC 76-3 BASE YEARS FY 77-79**

	Average FY 77-79	Differences from FY 77-79 Baseline			Average FY 81-83
		FY 81	FY 82	FY 83	
CITP Less 30% Offset	4.3%	(0.0%)	(0.1%)	(0.3%)	(0.2)
Risk	5.1	(0.8 )	(0.6 )	(0.1)	(0.5)
Weight Applied	-	(0.6)	(0.3)	(0.6)	(0.5)
Dist. Contract Types	-	(0.2)	(0.3)	0.5	(0)
FCE	0.7	0.2	0.1	0.2	0.2
Special Factors	0.5	(0.3)	(0.3)	(0.4)	(0.4)
COM, Baseline 8%	0.7	0.2	0.1	0.2	0.2
<u>Treasury Rate Changes</u>	<u>0.1</u>	<u>0.4</u>	<u>0.6</u>	<u>0.6</u>	<u>0.6</u>
Subtotal	11.3	(0.3)	(0.2)	0.2	(0.1)
DAC 76-23 Offset Changes	-	1.0	0.9	1.2	1.1
Increased FCE Weight	-	1.0	0.9	1.0	1.0
Unrecognized FCE	-	(0.2)	(0.2)	(0.1)	(0.2)
COM Offset	-	(0.2)	(0.1)	(0.1)	(0.1)
<u>Reduced CITP Offset</u>	<u>-</u>	<u>0.4</u>	<u>0.3</u>	<u>0.4</u>	<u>0.4</u>
Total Difference		0.7	0.7	1.4	1.0
Total Markup Objective	11.3	12.0	12.0	12.8	12.3

Note: Columns may not add due to rounding.

Source: DD Form 1499 Data Base - All contracts using Weighted Guidelines

CITP and the "distribution of contract types" portion of risk were unaffected by DAC 76-23. Changes in these factors had a net effect of reducing markup by 0.2%.

The lowering of the average weight assigned to cost risk is primarily due to the reduced weight ranges for risk available on R&D and service contracts. On average, this reduced markup by 0.5%.

The amount of facilities capital employed increased, causing markups to increase by 0.2%.

Cost of money increased, independently of treasury rate changes, by 0.2%. This is a direct result of increased facilities.

Special factors returned to their pre-DPC 76-3 insignificance, dropping markup by 0.4%. As discussed in the analysis of DPC 76-3's effects, the increase in special factors may have been a method of overcoming perceived inadequate markups on R&D and service contracts. With DAC 76-23 this was no longer necessary.

Treasury rate changes began to be a major influence, increasing markup by an average 0.6%. In concept, of course, actual interest expense also increased, so markup increased but economic profit did not. These changes would have had about the same effect on markup in the absence of DAC 76-23.

The subtotal shows very little markup change before the effects of the group of DAC 76-23 offset changes. It should be noted, however, that the decreases in weight for risk and special factors, which may have been due primarily to DAC 76-23, decreased markup by 0.9%. All but .1% of this decrease was offset by other changes which were not caused by DAC 76-23.

The four changes made by DAC 76-23 to elements of the DPC 76-3 offset of 30% of CITP against COM and FCE, are:

Increasing markup by:

- o Increasing the FCE weight ranges from 6-10% to 16-20%.
- o Eliminating the 30% CITP offset factor for R&D and service contracts.

Decreasing markup by:

- o Reducing R&D and service contract markups by an amount equal to COM, but still allowing COM.
- o Not recognizing FCE in R&D and service contracts.

As can be seen from Exhibit 8, these changes increased markup. The reduction in COM (-0.1) and nonrecognition of FCE (-0.2) did not balance the increase in weight (1.0) and the reduced CITP offset (0.4). There was a net increase in markup of 1.1% from these changes.

Since DAC 76-23 also lowered risk and special profit, it would be fair to summarize the net effect of DAC 76-23 as increasing markup by .5% to 1%.

#### Original DPC 76-3 Offset in FY 81-83

The 30% offset, more than adequate to cover COM and FCE in FY 77-79, was insufficient in FY 81-83, as shown on Exhibit 9.

**EXHIBIT 9**  
**INSUFFICIENCY OF DPC 76-3 OFFSET**  
**DURING FY 81-83**

	<u>FY 81</u>	<u>FY 82</u>	<u>FY 83</u>	<u>Average FY 81-83</u>
30% Offset	-1.4%	-1.5%	-1.5%	-1.5%
COM at 8% Treasury Rate	.9	.8	.9	.9
FCE	<u>.9</u>	<u>.8</u>	<u>.9</u>	<u>.9</u>
Net Insufficiency in Offset	.4%	.1%	.3%	.3%

Source: DD Form 1499 Data Base

The reason for the insufficiency is a growth in capital intensity. Since more facilities were used, CITP was a smaller part of total markup, and COM and FCE were higher. This would not be considered a failure of the offset. It is consistent with the intent of DPC 76-3 and DAC 76-23.

**Markup Data Excluding Shipbuilding**

The preceding analysis included shipbuilding markup objectives for two reasons. First, limitations of the data base precluded elimination of shipbuilding from the FY 75 data. Since this base year included shipbuilding, shipbuilding had to be included in the comparisons. Second, it was thought that the shipbuilding industry would benefit from DPC 76-3, along with other capital intensive defense contractors, at the expense of those less capital intensive. Consequently, analysis of the success of the DPC 76-3 offset in preventing increases in markup due to COM and FCE would be incomplete without shipbuilding.

The shipbuilding markup data contains anomalies, however, which tend to distort the analysis. These are caused by the dual nature of the data, which includes reports on both ship construction and certain parts and systems bought by the Government and furnished to shipbuilders for incorporation into ships. In some years, the data includes little or no ship construction, but is strongly influenced by nuclear reactor parts contracts, which are usually cost-type and have little or no direct labor, FCE, or COM. In years when large ships are purchased, the markup characteristics are very different.

For these reasons, analysis of markup trends without shipbuilding may be more meaningful for some purposes, although it should not be used for calculating the aggregate effects of the DPC 76-3 and DAC 76-23 offsets. Those trends are shown in Exhibit 10.

Analysis of Exhibit 10, together with the preceding analysis of DPC 76-3 and DAC 76-23, suggests several conclusions:

(1) DPC 76-3's introduction of cost of money and facilities capital employed, coupled with the 30% offset to CITP, had a net effect of reducing markups.



(2) DAC 76-23's "midcourse correction" increased FCE and made minor changes to other offset elements, causing markups to increase by .5% to 1%.

(3) Special factors may be influencing markup objectives in unintended ways, to some extent counteracting DoD's policy goals.

(4) Facilities investment has remained essentially constant as a percentage of sales. (This is less apparent before the exclusion of shipbuilding.)

(5) In order of importance, the significant factors tending to increase DoD's markups have been:

- o Increased use of fixed-price contracts
- o DAC 76-23 changes to the offset elements
- o Increases in the treasury rate

#### EXHIBIT 10

##### MARKUP CHANGES EXCLUDING SHIPBUILDING (CONTRACTS WHICH USED WEIGHTED GUIDELINES)

	BASE YEAR						
	<u>FY 77</u>	<u>FY 78</u>	<u>FY 79</u>	<u>FY 80</u>	<u>FY 81</u>	<u>FY 82</u>	<u>FY 83</u>
CITP Less 30% Offset	4.3%	(0.1)%	0.1%	0.1%	0.2%	0.1%	(0.2)%
Risk	5.1	0.1	0.1	(0.3)	(0.6)	(0.4)	0.4
Weight Applied	-	0.0	0.1	(0.2)	(0.5)	(0.3)	(0.4)
Dist. Contract Types	-	0.1	0.0	(0.1)	(0.1)	(0.1)	0.8
FCE	0.6	0	0	0	0	0.1	0
Special factors	0.5	(0.1)	0	(0.2)	(0.3)	(0.3)	(0.2)
COM, Baseline 8%	0.7	0	0	0	0	0.1	0
Treasury Rate Changes	-	0	0.1	0.2	0.4	0.7	0.5
DAC 76-23 Offset Changes	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>0.3</u>	<u>0.7</u>	<u>1.0</u>	<u>0.9</u>
Total Differences	N/A	(0.1)	0.2	0.2	0.3	1.3	1.3
Total Markup Objective	11.2%	11.1%	11.4%	11.4%	11.5%	12.5%	12.5%

Note: Columns may not add due to rounding.

Source: DD Form 1499 Data Base

Exhibit 11 demonstrates the trends in DoD markup objectives when shipbuilding is excluded from the data base.

# EXHIBIT 11

## MARKUP OBJECTIVE RATES EXCLUDING SHIPBUILDING (CONTRACTS WHICH USED WEIGHTED GUIDELINES)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
WEIGHTED GUIDELINES							
PROFIT FACTORS							
EFFORT (CONSIDERS OFFSET)	4.25%	4.21%	4.41%	4.40%	4.60%	4.48%	4.29%
RISK	5.10	5.16	5.20	4.85	4.53	4.73	5.46
PROFIT ON INVESTMENT	.66	.62	.63	.93	1.19	1.62	1.35
PAST PERFORMANCE	--	--	--	--	--	--	--
SPECIAL PROFIT	--	--	--	--	--	--	--
INDEPENDENT DEVELOPMENT	.09	.05	.08	.11	.03	.02	.03
SOURCE OF RESOURCES	--	--	--	--	--	--	--
OTHER	.37	.45	.28	.17	.14	.16	.22
SUBTOTAL	10.47%	10.49%	10.60%	10.46%	10.49%	11.01%	11.35%
COST OF MONEY	.69	.65	.75	.93	1.05	1.48	1.19
TOTAL	11.16%	11.14%	11.35%	11.39%	11.54%	12.49%	12.54%

Source: DD Form 1499 Data Base

## MEASURES OF PROFITABILITY

### Need for Special Measures

The DFAIR, like past profit studies, was faced with the problem of selecting appropriate and meaningful measures to be used in comparing profits realized on negotiated defense contracts with the profits realized on comparable commercial work.

Obtaining information which isolated the profits achieved on negotiated defense contracts required companies to segregate and report operating results of various categories of business conducted within individual business segments. This sort of information could be relatively easily, and quite accurately, reported on a before interest and federal tax basis in a manner that would closely correspond to the "operating profit" information contained in the Bureau of the Census Quarterly Financial Reports (QFR) for Manufacturing, Mining and Trade Corporations. Identifying interest expense and federal income taxes to negotiated defense contracts, however, would have been virtually impossible and would have required arbitrary and potentially very misleading allocations. For this reason, traditional measures relied upon by financial analysts to compare corporate performance, such as return on capital and return on equity, were not deemed to be practical to pursue.

### Measurement of Assets

Since a comparison of return on the sources of capital (debt and equity) was impractical, the remaining option was to use a return on assets measure, but there were still questions about which assets should be appropriately included. Some were obvious, such as the fixed assets, inventories and accounts receivable associated with defense contracts. Others such as intangibles and cash were somewhat more questionable. There is, no doubt, some causal beneficial relationship between these latter assets and defense contracts, but it is not clearly defined within many contractor accounting systems, and again would have required using arbitrary allocation rules to assign them to defense contracts. Since QFR data clearly isolated the obvious assets to be considered from the less obvious, the DFAIR chose to minimize asset allocations and use only fixed assets and current assets less cash as the asset measure of return.

Current assets less cash, however, still presented a problem because of the dramatic differences in the magnitude and accounting treatment of progress payments. Progress payments and advances from the Government are about 3% of gross accounts receivable and inventories in the QFR data while they are in excess of 60% for negotiated defense contracts. In addition, the QFR treats progress payments as a liability while most defense contractors treat them as a contra-asset and, for external financial reporting purposes, record inventories and accounts receivable in an amount which is net of progress payments.

### Profit '76 Measures

Profit '76 chose to use profit before taxes/sales and profit before taxes/total fixed and current assets (less cash and progress payments) as their measures of profitability. These measures have two deficiencies: 1) they include the effects of interest expense and other non-operating income and expense which are not associated with performance on contracts, and 2) they fail to make any adjustment for the value of interest-free Government financing.

### Operating Profit and Adjustments

The DFAIR resolved the Profit '76 methodological deficiencies in two ways. Operating profit (in lieu of Profit '76's profit before taxes) was used as the basic measure, to eliminate interest and other non-operating income and expense. In addition, to adjust for the value of Government financing, the average value of Government progress payments for each of the 14 years of the Profit '76 and DFAIR studies was multiplied by the short term commercial loan rate for that year, to obtain the amount to be added to sales and operating profit of both the negotiated defense contracts and QFR data. This adjustment results in a sales and operating profit increase sufficient to cover the costs of commercial financing of total current assets without having any change to realized and reported profit before taxes (but after interest expense). After these adjustments are made, we can assume the total gross current assets less cash were owned and financed by the companies and can include them in the asset base to measure operating profits to assets.

### "Economic" Profit

While the adjusted operating profit resolves the issue of how to treat current assets on a comparable basis, it must be reduced by the opportunity costs of the assets employed in order to arrive at a before tax "economic" profit. Since different assets have different risks and therefore costs, it was necessary to use different interest rates. The short term commercial loan rate was used to calculate the opportunity cost of current assets employed, while the Treasury rate required for CAS 414 was used to calculate the opportunity cost of fixed assets. The "economic" profit thus derived for negotiated defense contracts and the QFR firms provides the best means of comparing the two diverse sets of data.

### Negotiated Markup

In addition to the comparison of "economic" profits realized on DoD contracts and the QFR, the DFAIR also needed to compare the perceived government contracting officers' markup with that actually realized on defense negotiated contracts. That analysis was performed and is discussed later in this chapter.

### COMPARISON OF COMPANY DATA TO QFR DATA

Quarterly Financial Reports (QFR) for Manufacturing, Mining and Trade Corporations are published by the Bureau of the Census, Department of Commerce and were used during the Profit '76 study to develop profit rates experienced by commercial firms. These commercial rates were compared to rates reported by DoD contractors to determine the reasonableness of DoD contractor profits. The category entitled "durable manufacturing industries" was used for this purpose.

Since one of the objectives of DFAIR is to determine the results of policy changes made since the Profit '76 study, the analyses made during that study have been extended to the present. However, the QFR data was adjusted to yield a more realistic basis for comparison; i.e., rather than using total durable manufacturing industries data, we have eliminated the industries that are not comparable to work performed by defense contractors in the negotiated contract environment and which would contaminate the measurement base if not eliminated. The groups which were deleted from the total are:

#### INDUSTRY

Stone, Clay and Glass Products  
Primary Metals Industries  
Lumber and Wood Products, Furniture and Fixtures, and  
Miscellaneous Manufacturing Industries

Defense contractor data collected by Profit '76 and DFAIR has also been adjusted for better comparison to QFR data. Because contracts with the shipbuilding industry contain different financing provisions and different pricing/profit mechanisms, they are eliminated from analyses performed in this section and are analyzed separately in Chapter VIII. Data collected for service contracts has also been deleted from the analyses performed here because it cannot be compared to data for durable manufacturing industries.

As noted earlier, the DFAIR measure of profitability differs as follows from the Profit '76 measure:

<u>PROFIT '76</u>		<u>DFAIR</u>	
Return on Sales:	$\frac{\text{Profit Before Taxes}}{\text{Sales}}$	Profit Before Interest & Taxes + Imputed Value of Govt Financing	$\frac{\text{Sales} + \text{Imputed Value of Govt Financing}}{\text{Sales} + \text{Imputed Value of Govt Financing}}$
Return on Assets:	$\frac{\text{Profit Before Taxes}}{\text{Total Assets} - \text{Cash} - \text{Progress Payments}}$	Profit Before Interest & Taxes + Imputed Value of Govt Financing	$\frac{\text{Total Assets} - \text{Cash}}{\text{Total Assets} - \text{Cash}}$

In order to provide a more comprehensive analysis, charts are presented

using both the Profit '76 methodology and the DFAIR methodology. However, since profit before interest and taxes (i.e., operating profit) appears to be the better measure of profitability because it is compatible with DoD pricing and costing policies (i.e., it excludes income and expenses such as interest revenue, franchise fees and earnings from subsidiaries which are not relevant to government contracts), Profit '76 data has been reconstructed with operating profit used in all calculations instead of profit before taxes.

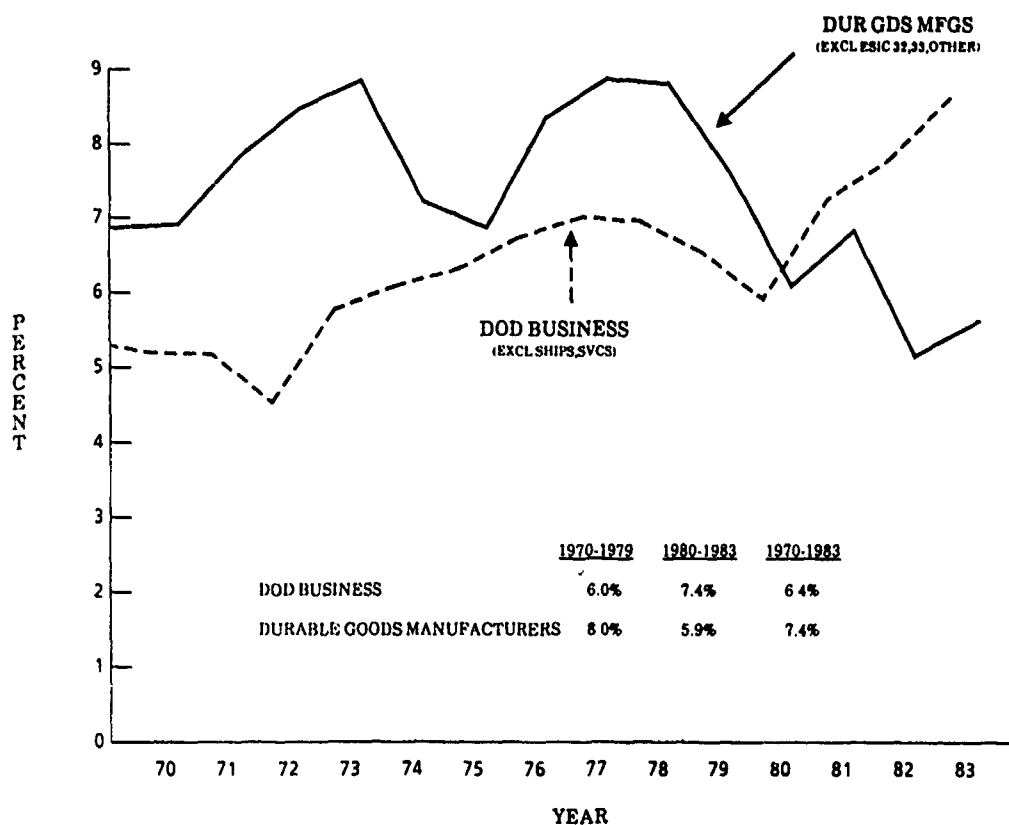
Wherever DoD business data is shown, it is data for Profit '76 and DFAIR DoD contracts. Profit '76 data covers the years 1970 through 1974 and DFAIR data covers the years 1975 through 1983. QFR data for comparable durable manufacturing industries will be referred to as durable goods manufacturers' (DGM) data.

### **Operating Profit/Sales**

**Operating Profit/Sales:** Exhibit 12 shows the trends in operating profit/sales for DoD contracts and for comparable durable goods manufacturers. For the years prior to DPC 76-3, DoD business profitability averaged 2.1 percentage points lower than durable goods manufacturers. Since DPC 76-3, DoD business and durable goods manufacturers have experienced very similar average earnings on sales. Since 1981, DoD business profitability has, for the first time in the fourteen year period covered by the Profit '76 and DFAIR surveys, exceeded durable goods manufacturers' profitability. It is interesting to note that DoD business earnings exceeded DGM earnings only during a severe recession. For the fourteen year period, the DGM average is approximately one percentage point higher than the DoD business average. This relationship of higher return on sales for durable goods manufacturers has been noted in prior profit studies. This chart extends the analysis performed during the Profit '76 study, but does not consider the impact on profitability resulting from Government provided financing in the form of progress payments.

## EXHIBIT 12

### OPERATING PROFIT/SALES



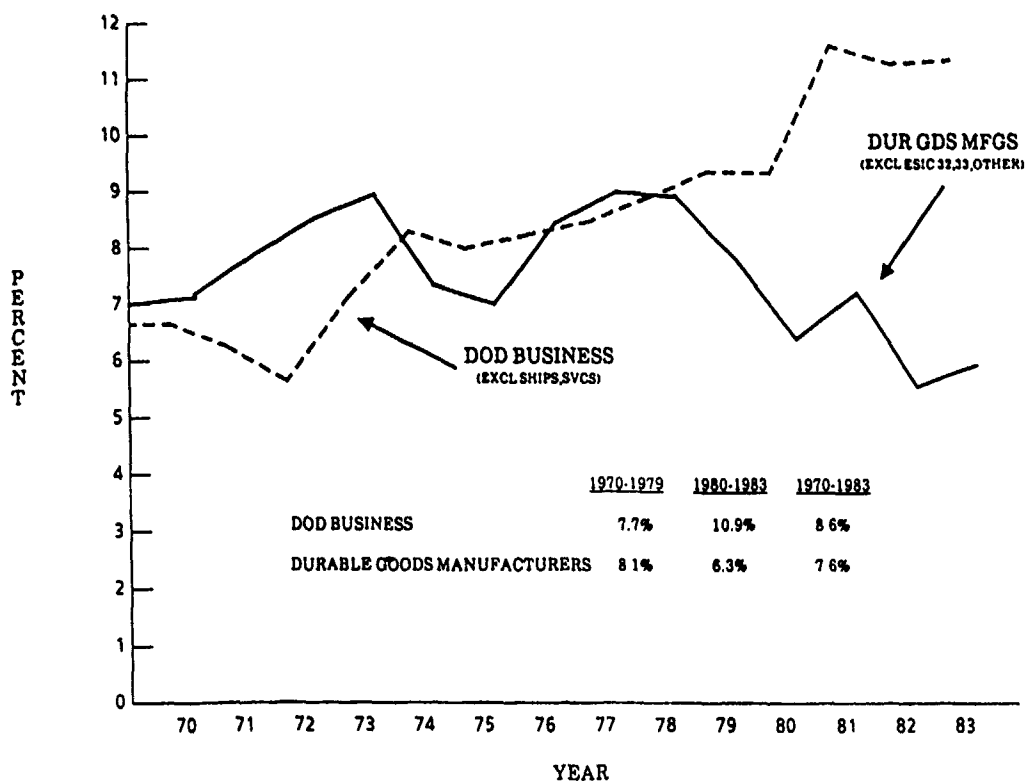
Sources: Touche Ross; Profit '76 and QFR

Operating Profit + Imputed Interest/Sales + Imputed Interest: As noted earlier, the DFAIR method of analyzing operating profit/sales is to impute an interest amount for progress payments provided to defense contractors, and to add this amount to both operating profit and sales. Since the QFR provides similar data on Government advances and prepayments for durable goods manufacturers, DGM data was also adjusted. The effect of this adjustment is to increase the operating profit/sales ratio for DoD business by anywhere from 1.1 to 4.3 percentage points, and for DGM by anywhere from 0 to .4 percentage points.

Exhibit 13 shows the impact of this adjustment for the fourteen year period. Profitability was, on the average, .4 percentage points more for DGM than for DoD business from 1970 to 1979. However, as short-term commercial loan rates skyrocketed in the 1979-1982 time frame, the financing which defense contractors received became more valuable. Thus, during the 1980 to 1983 period, profitability for DoD business was, on the average, 4.6 percentage points higher for DoD business than for DGM. Again, DGM earnings were significantly depressed by the economic recession which occurred. For the fourteen year period 1970 to 1983, DoD business averaged 1 percentage point higher than DGM.

### EXHIBIT 13

OPERATING PROFIT + IMPUTED INTEREST/SALES + IMPUTED INTEREST



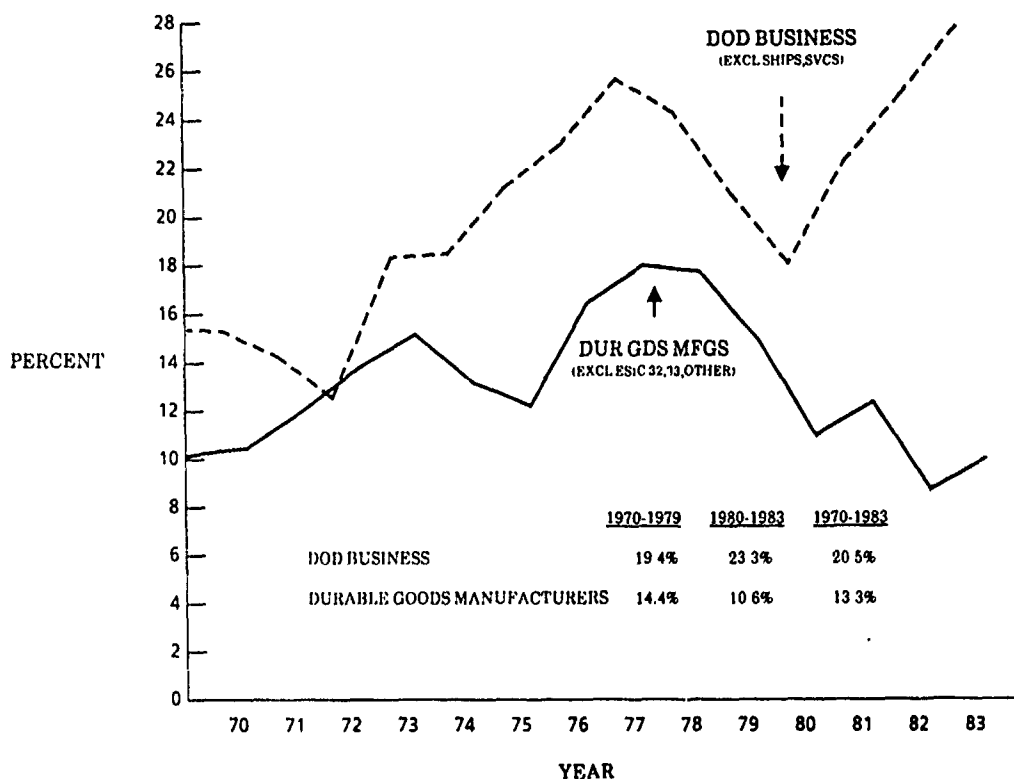
Sources: Touche Ross; Profit '76 and QFR



## Operating Profit/Assets

Operating Profit/Assets Less Cash and Less Progress Payments: Exhibit 14 shows the trends of operating profit to assets (less cash and progress payments). This ratio was a key ingredient in the Profit '76 analysis. Progress payments were removed from the asset base because they were thought to represent a government asset, not a contractor asset. The Profit '76 report admitted that their definition was a conservative definition of investment. Nonetheless, they chose to portray return on investment in this manner, and DFAIR has extended their analysis through 1983.

**EXHIBIT 14**  
OPERATING PROFIT/ASSETS (LESS CASH) - PROGRESS PAYMENTS



Sources: Touche Ross; Profit '76 and QFR

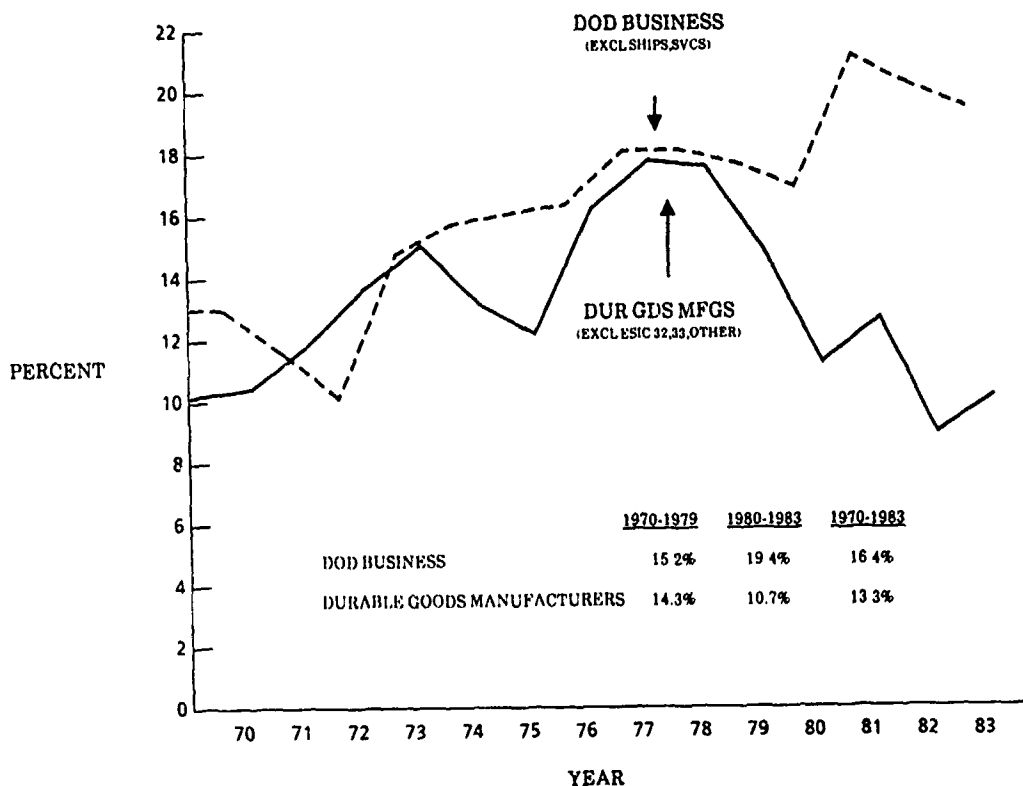
When profitability is measured in this manner, DoD business appears to be much more profitable than DGM. In reality, work-in-process inventory is typically financed by debt or equity. Eliminating assets financed by the Government, or by debt or equity, is inappropriate. A better method of accounting for the impact of progress payments is to determine their value and to increase operating profit by that amount.

Operating Profit + Imputed Interest/Assets Less Cash: Exhibit 15 demonstrates the approach for computing return on investment which treats Government provided financing in the same manner as debt or equity financing - i.e., the cost associated with the financing is included in operating profit.

As this exhibit demonstrates, DoD business appears to be more profitable than DGM when this measure of profitability is used. For the fourteen year period, DoD business was 3.1 percentage points higher than DGM, with the largest difference in profitability occurring during economic recession years.

#### EXHIBIT 15

##### OPERATING PROFIT + IMPUTED INTEREST/ASSETS (LESS CASH)

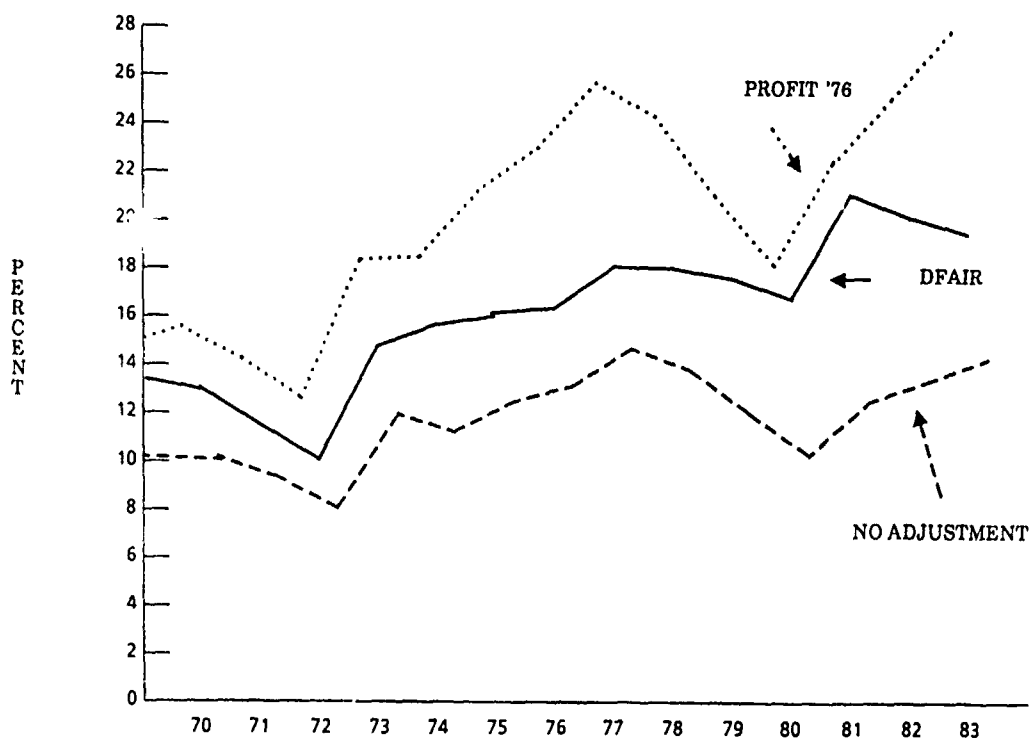


Sources: Touche Ross; Profit '76 and QFR

There are several ways of measuring operating profit/assets, depending on how Government furnished financing is treated. Exhibit 16 shows three possibilities. The Profit '76 method deducts progress payments from the asset base. The DFAIR method imputes an interest value to progress payments, and adds that amount to operating profit. The third method includes no adjustment for progress payments. Over the fourteen year period, return on assets averaged 20.5% using the Profit '76 method, 16.4% using the DFAIR method, and 12.0% when no adjustment is made. The DFAIR method has the benefit of resolving the current asset ownership issue. Under this method the assets are clearly owned and financed by the contractor.

#### EXHIBIT 16

##### OPERATING PROFIT/ASSETS MEASURES DOD BUSINESS (EXCLUDING SHIPS & SERVICES)



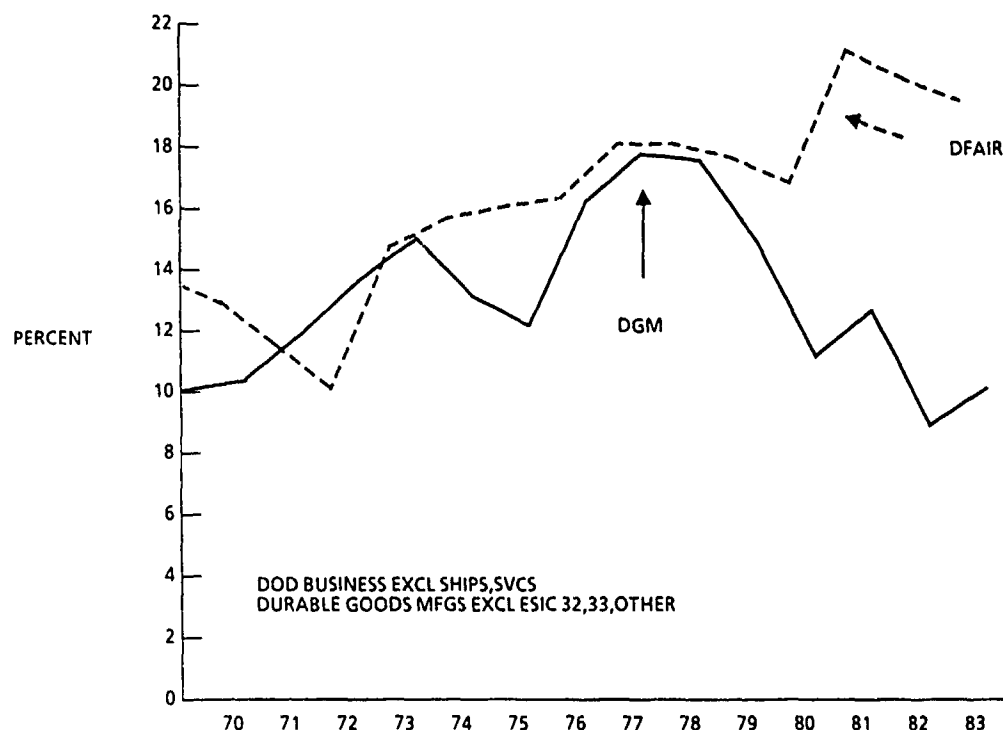
Sources: Touche Ross; Profit '76

Exhibit 17 compares the DFAIR method with the DGM return on assets. The fourteen year average return was 13.0% despite a fairly significant downturn in profitability from 1979 to 1983.

This exhibit shows that DGM return on assets was similar to DoD business return on assets through 1980.

### EXHIBIT 17

#### OPERATING PROFIT/ASSETS MEASURES



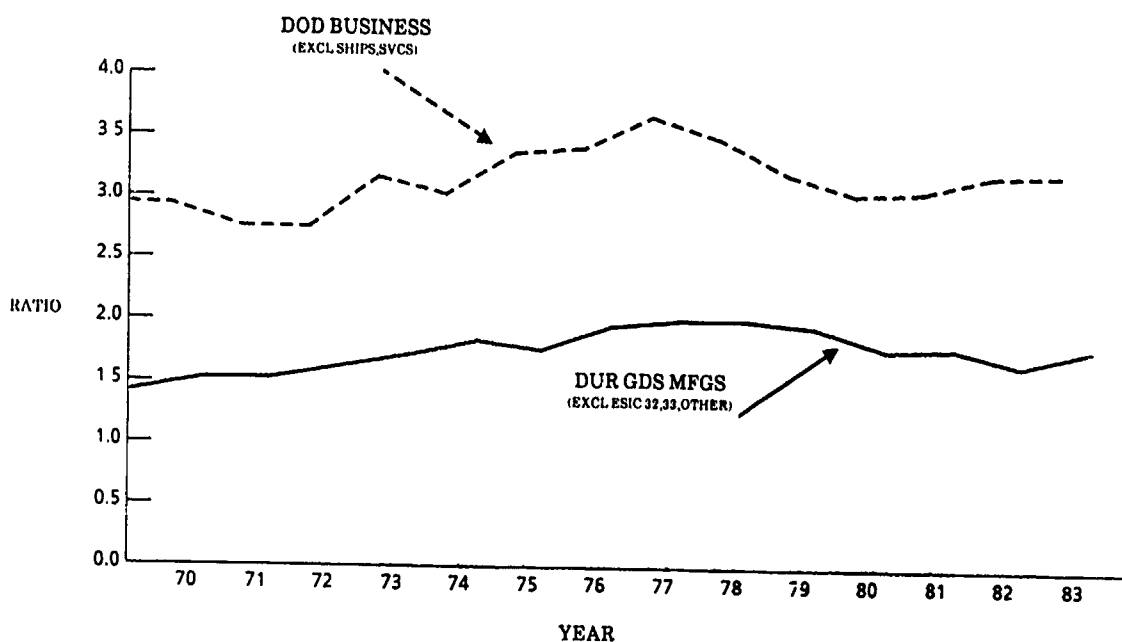
Sources: Touche Ross; Profit '76 and QFR

## Sales/Assets

Sales/Assets Less Cash and Less Progress Payments: The asset turnover ratio presented here is consistent with the methodology used in the Profit '76 analysis. Exhibit 18 shows that comparable durable goods manufacturers experienced sales volume which was 1.74 times the value of assets used to generate those sales from 1970 to 1983. DoD business sales are 3.17 times the value of assets used to generate the sales, after progress payments are removed from the asset base.

### EXHIBIT 18

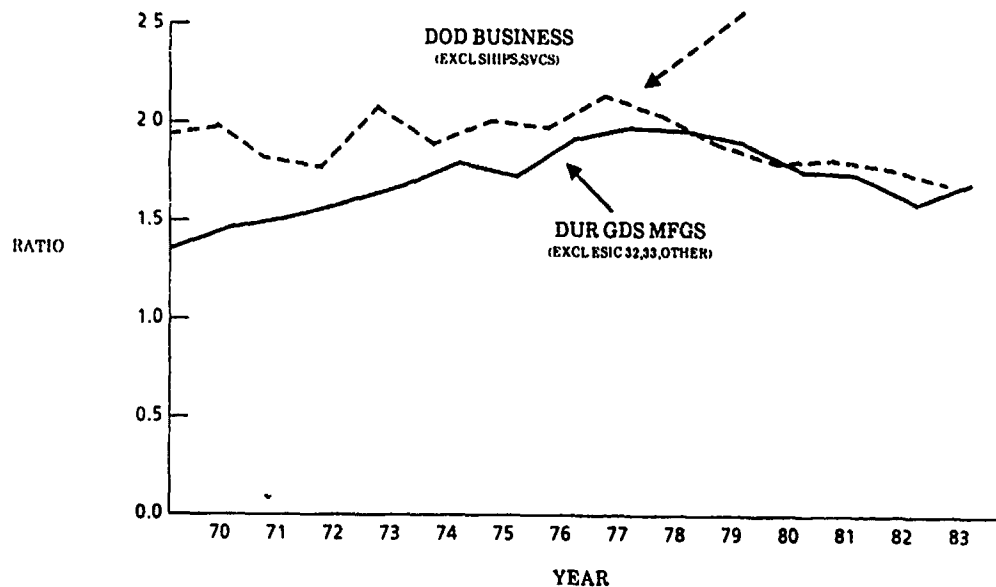
#### SALES/ASSETS (LESS CASH) - PROGRESS PAYMENTS



Sources: Touche Ross; Profit '76 and QFR

Sales + Imputed Interest/Assets Less Cash: When asset turnover is calculated by using the DFAIR methodology, the gap between DGM turnover and DoD business turnover is considerably narrowed as Exhibit 19 demonstrates. For the fourteen year period, DGMs averaged 1.74 asset turnover, while DoD business averaged 1.91. For the years since Profit '76 recommendations were implemented, DGMs averaged 1.81 while DoD business averaged 1.88.

**EXHIBIT 19**  
**SALES + IMPUTED INTEREST/ASSETS (LESS CASH)**



Sources: Touche Ross; Profit '76 and QFR

Thus, using this methodology, it is apparent that the gap narrowed and that the assets employed for defense business are extremely close to assets employed for DGM.

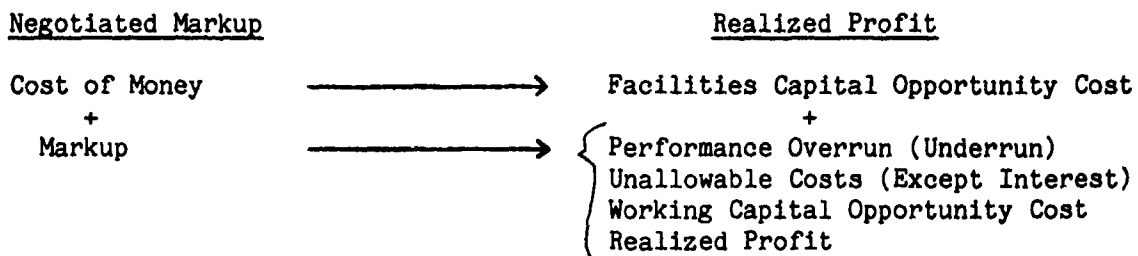
Data was also collected on the net book value of government-owned facilities for 1983. If this amount was added to the asset base, asset turnover would decrease by .04 percentage points for DoD business.

### Comparison of Negotiated Markup and "Economic Profit"

DoD's pricing policy for negotiated contracts is based on the full cost absorption concept (i.e., contractors are permitted to allocate a proportionate share of overhead costs to the direct labor and material costs of DoD contracts, with the allocation based on business volume projections). However, certain types of costs are unallowable on DoD negotiated contracts. If incurred, they must be paid by the contractor out of realized profits. Examples of unallowable costs include most advertising expense, entertainment expense, over-ceiling independent research and development/bid and proposal expense, lobbying costs, and interest expense.

Markup objectives are developed in part by using estimated cost (excluding all unallowable costs) as the basis for applying markup weights. The markup objective and, ultimately, the amount negotiated do not explicitly consider a contractor's unallowable costs. However, it is recognized that unallowable costs exist, that they are a cost of doing business, and that they will be paid out of a contractor's realized profit dollars. Thus, it is recognized that negotiated markup may be used by a contractor to pay for unallowable expenses (other than interest) and for the opportunity cost related to work-in-process inventory, for any cost overruns (underruns) incurred during contract performance, and for pure profit. Facilities capital cost of money, which DoD usually combines with markup amounts for analysis and reporting purposes, reimburses a contractor for the opportunity cost related to fixed asset acquisition. This relationship is depicted in Exhibit 20.

#### **EXHIBIT 20 RELATIONSHIP OF NEGOTIATED MARKUP TO REALIZED PROFIT**



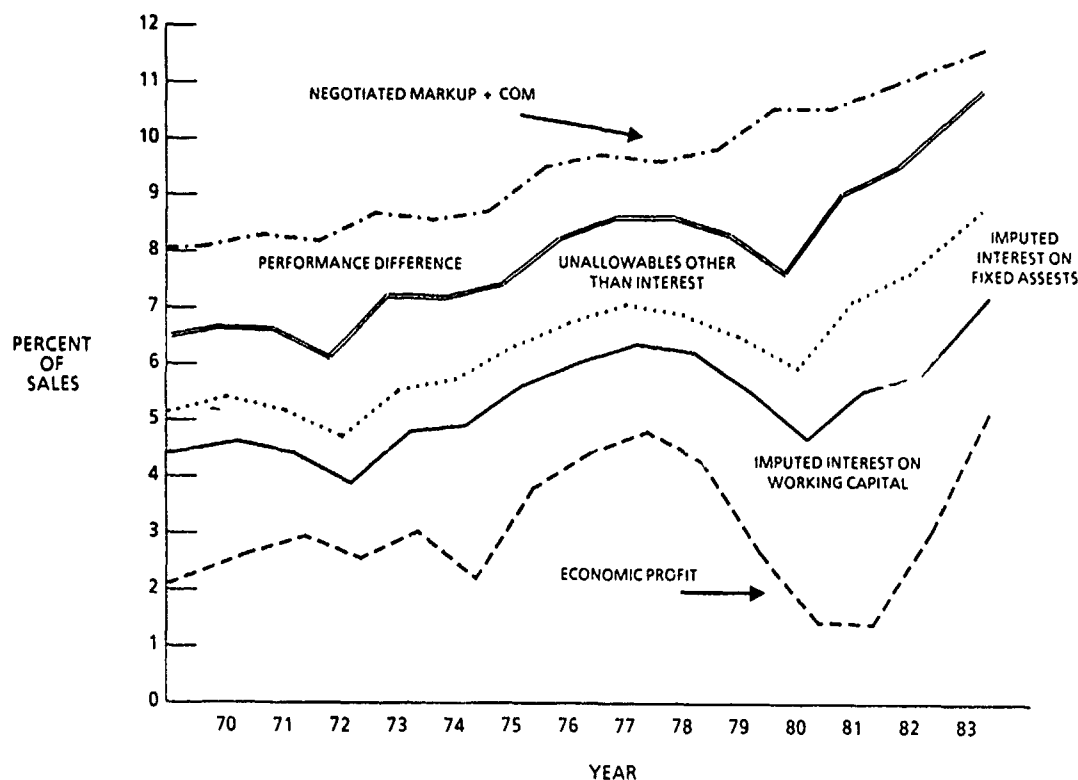
We can analyze the difference between negotiated markup and realized profit in terms of its components based on the DFAIR data. Exhibit 21 shows all ratios as a percent of sales. Note that all previous exhibits in this chapter expressed markup as a percent of cost. (Shipbuilding has been excluded from this analysis and is addressed in a separate chapter.) The top line is negotiated markup plus cost of money, and the second line is sales less allowable costs. The gap between the two lines represents the difference between expected performance and actual performance, which we have termed "performance difference." Next, unallowables other than interest have been deducted. The resulting line depicts operating profit/sales.

Two separate components of opportunity cost are pertinent to DoD contract effort -- one related to the cost of fixed assets employed and the other related to the cost of work-in-process inventory. The analysis presented here assigns an opportunity cost to all contractor-furnished financing. For fixed asset costs, the Treasury rates required for CAS 414 purposes were used. For working capital, short-term commercial loan rates were used. These calculations represent a conservative commercial financing cost of resources that must be covered by operations.

The fourth line on Exhibit 21 is operating profit less facilities capital cost of money, and the difference between this line and the previous line has been termed "imputed interest on fixed assets." Next, imputed interest on working capital has been deducted.

The result of these computations is an economic profit which can be compared to the negotiated markup. Economic profit as used here is before taxes and after imputed interest. The difference between negotiated markup and economic profit is readily apparent. On the average, negotiated markup plus facilities capital cost of money averaged 9.5% for the fourteen year period, while economic profit averaged 3.1%.

**EXHIBIT 21**  
NEGOTIATED VS. ECONOMIC PROFIT  
DOD BUSINESS (EXCLUDING SHIPS & SERVICES)



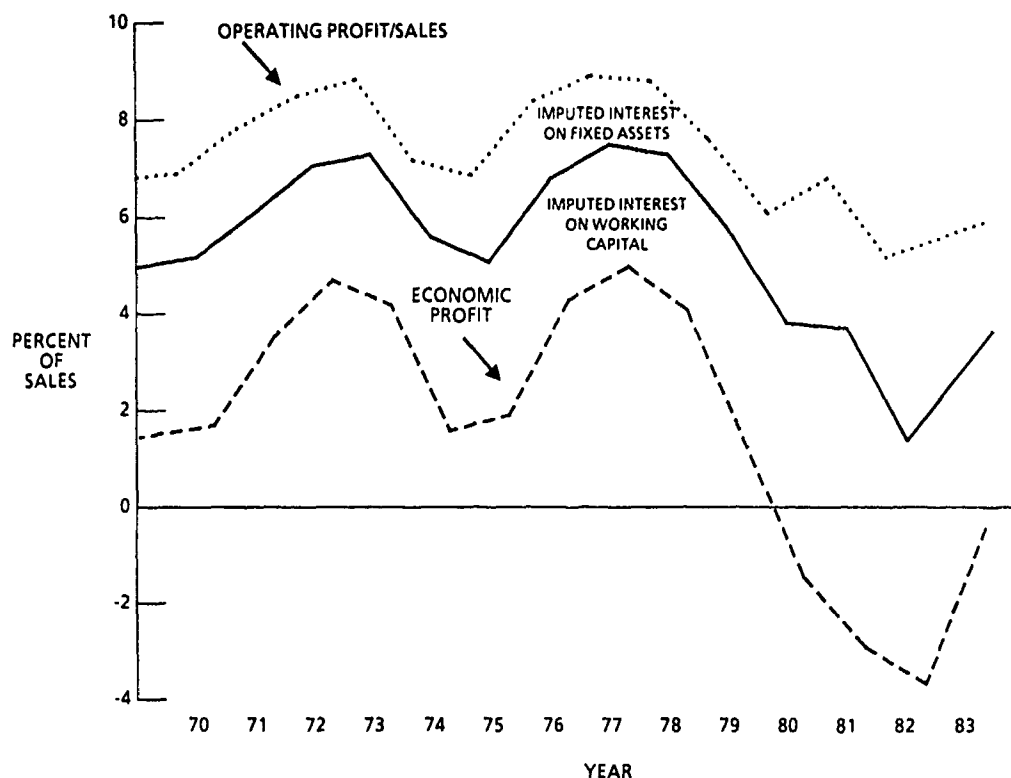
Sources: DD Form 1499 Data Base; Touche Ross



Economic profit was also calculated for comparable durable goods manufacturers. Exhibit 22 demonstrates the severity of the recessions which occurred in the 1980 to 1982 period and which resulted in economic losses for durable goods manufacturers. For the fourteen year period economic profit averaged 1.7%.

## EXHIBIT 22

### ECONOMIC PROFIT DURABLE GOODS MANUFACTURERS (EXCLUDING ESIC 32,33, OTHER)



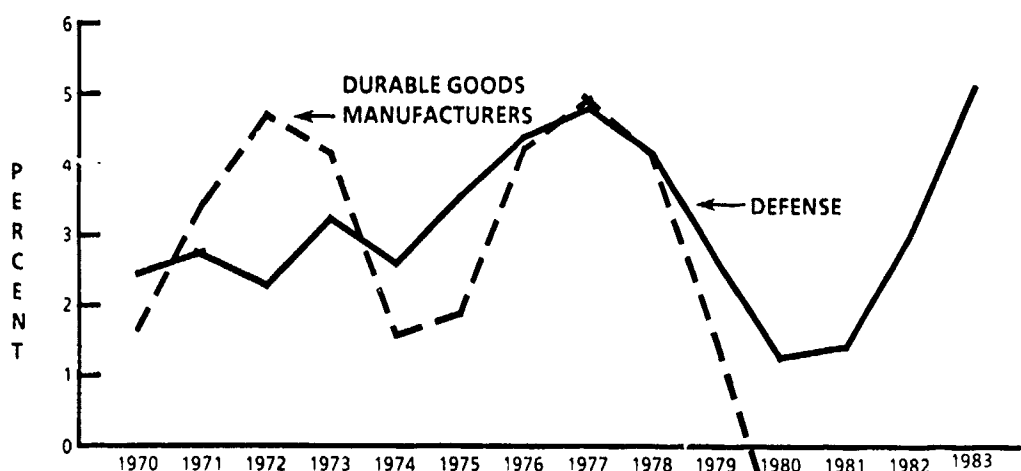
Source: QFR

The two previous exhibits did not adjust operating profit or sales for the value of progress payments. The next two exhibits make this adjustment.

Exhibit 23 compares economic profit/sales for DoD business (excluding ships and services) to comparable durable goods manufacturers. For the 10-year period 1970-1979, the average returns-on-sales were almost identical. For the recessionary period 1980-1983, however, durable goods manufacturers experienced substantial economic losses, while DoD business profitability declined only slightly.

### EXHIBIT 23

## ECONOMIC PROFIT/SALES



#### AVERAGES

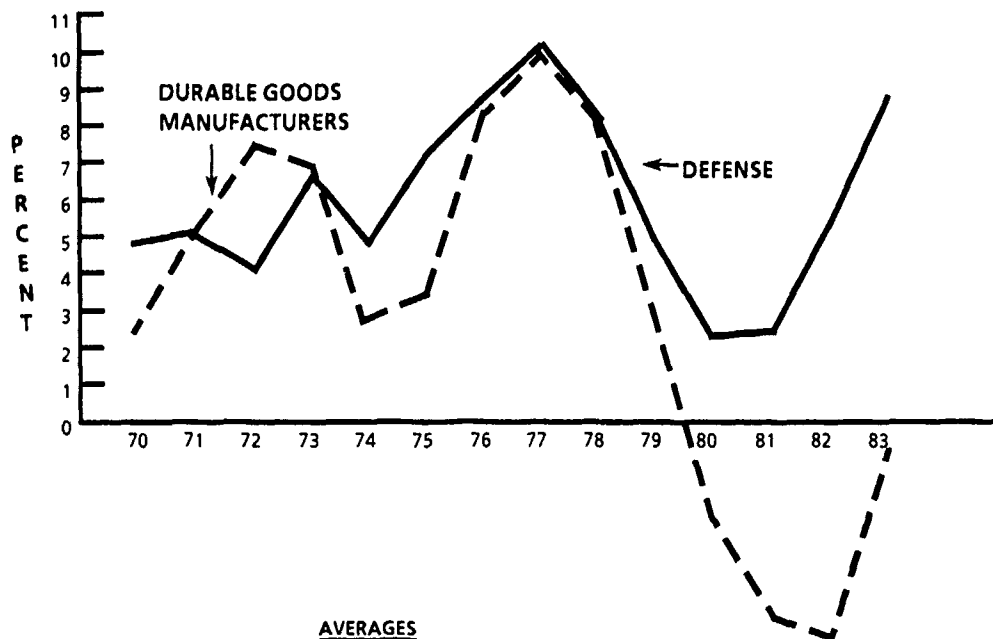
	1970-1979	1980-1983
DoD	3.29%	2.69%
DGM	3.25%	-2.15%

Sources: Touche Ross; Profit '76 and QFR

Exhibit 24 compares economic profit/assets for both groups. The 10-year average returns are very similar, but again for the 1980-1983 period, durable goods manufacturers experienced significant losses while DoD business return-on-assets declined moderately.

#### EXHIBIT 24

### ECONOMIC PROFIT/ASSETS



#### AVERAGES

	1970-1979	1980-1983
DoD	6.52%	4.73%
DGM	5.76%	-3.65%

Sources: Touche Ross, Profit '76 and QFR

Of all the measures of profitability examined, the economic profit/sales and economic profit/assets approaches shown in Exhibits 23 and 24 are the most meaningful. These measures adjust for the value of progress payments, as well as for the opportunity costs associated with fixed assets and inventories. These before tax measures maintain neutrality on the sources of capital and focus instead on assets which are used in the performance of DoD work at the business segment level.

These measures demonstrate that profitability for DoD business is very similar to that of durable goods manufacturers when the abnormal 1980-1983 period is excluded from the comparison.

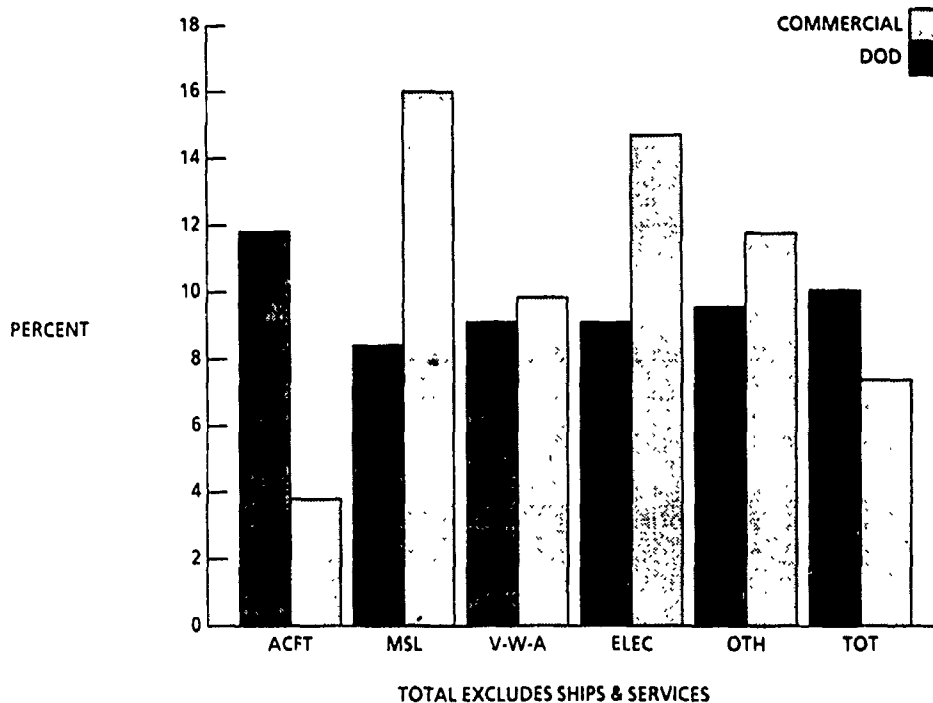
## DOD BUSINESS VS. COMMERCIAL BUSINESS PROFITABILITY

Financial data was also collected by customer, so it is possible to compare profitability for DoD business to profitability for commercial business within the same business segments. This analysis has been performed at the product group level. Only the DFAIR method of analyzing profitability has been presented since relative profitability is being demonstrated.

**Operating Profit + Imputed Interest/Sales + Imputed Interest:** Exhibit 25 presents average return on sales for both DoD and commercial business for the seven years since the implementation of Profit '76 recommendations. Commercial profitability is higher than DoD profitability in four of the five product groups examined. Only in the aircraft product group does DoD profitability exceed commercial. Commercial aircraft profitability was depressed during these years, partly due to the decline in domestic sales of commercial aircraft and civil helicopters and due to a decline in exports.

### EXHIBIT 25

OPERATING PROFIT + IMPUTED INTEREST/  
SALES + IMPUTED INTEREST  
1977 - 1983 AVERAGE

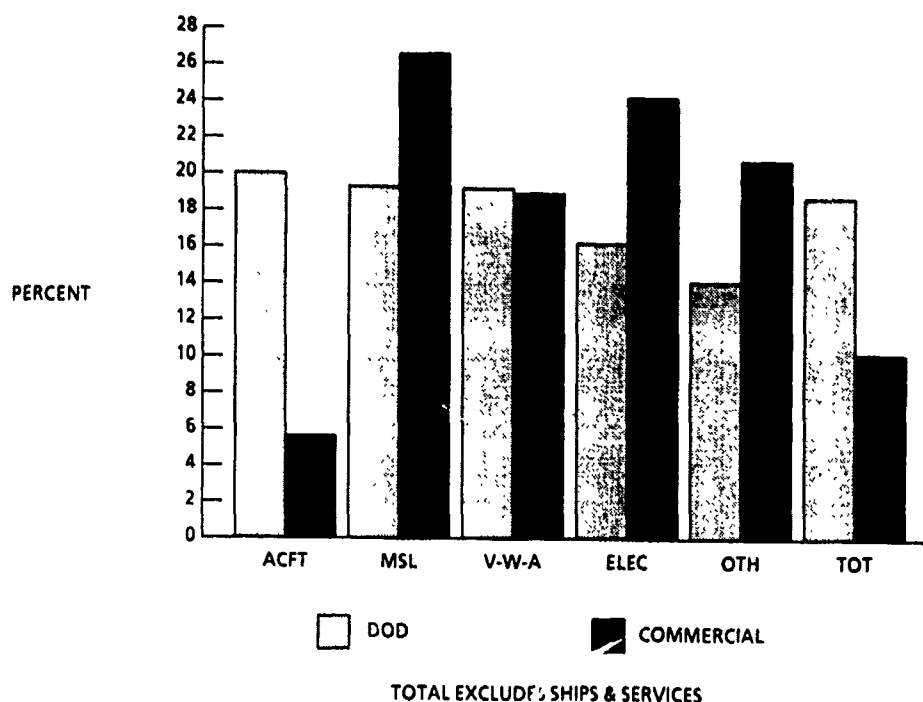


Source: Touche Ross

**Operating Profit + Imputed Interest/Assets:** Exhibit 26 shows that the seven year average return on assets was significantly higher for commercial missiles/space systems, electronics and other equipment. For vehicles-weapons-ammunition, profitability was almost identical for DoD and commercial business. Again, the DoD aircraft product group outperformed commercial aircraft by a factor of 3 to 1; however, DoD aircraft return on investment was very similar to missile/space systems and vehicles-weapons-ammunition.

#### EXHIBIT 26

##### OPERATING PROFIT + IMPUTED INTEREST/ASSETS 1977 - 1983 AVERAGE

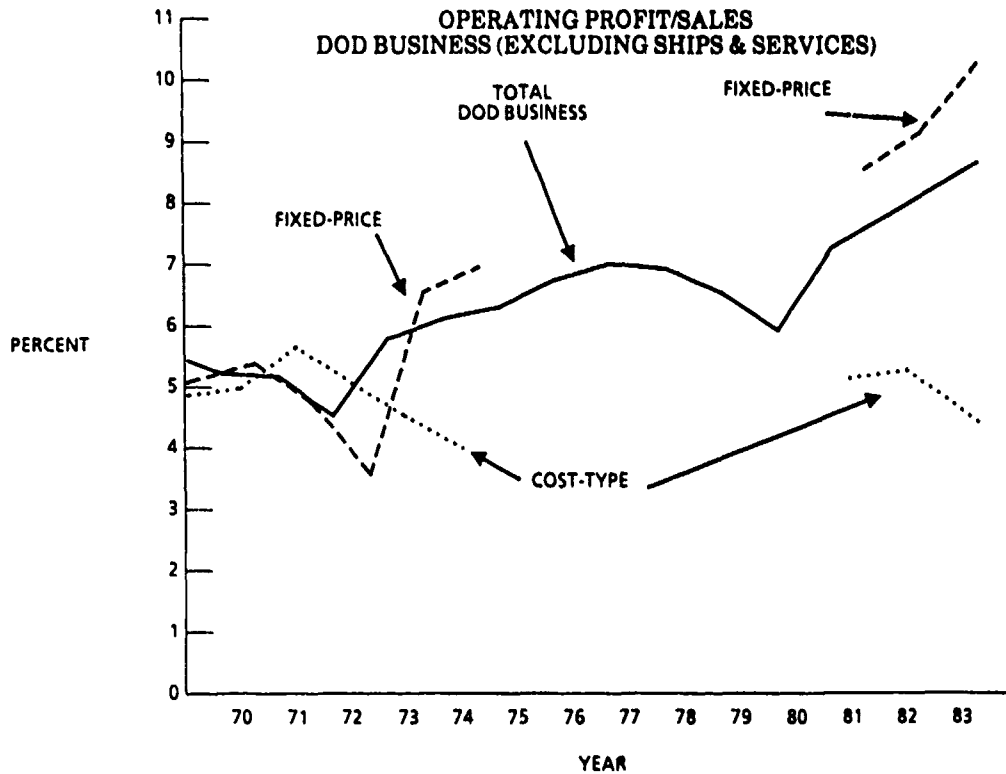


Source: Touche Ross

#### PROFITABILITY BY TYPE OF CONTRACT

Profitability data was collected by type of contract for the years 1970 to 1974 and 1981 to 1983. Exhibit 27 compares the return on sales for fixed-price contracts with cost-type contracts. Data shown in Exhibit 27 is for DoD prime contracts only, with shipbuilding and services removed. Also shown for reference purposes is the profitability trend line for DoD business for 1970 to 1983.

# EXHIBIT 27



Sources: Touche Ross; Profit '76

From 1970 to 1974, cost-type contracts averaged 4.8% return on sales while fixed-price contracts averaged 5.4%. However, if the impact of Government-provided financing is considered, fixed-price contracts were actually less profitable than cost-type contracts on an after-interest basis. Since the progress payment rate for fixed-price contracts during this period was 70% to 80% of costs incurred, while cost-type contracts were reimbursed 100% of costs incurred, contractors were required to finance 20% to 30% of costs incurred on fixed-price contracts. The projected cost of the additional contractor-provided financing on fixed-price contracts is 1.4% of contract price. Thus, realized profit on fixed-price contracts was closer to 4.0% after the difference in contract financing is considered.

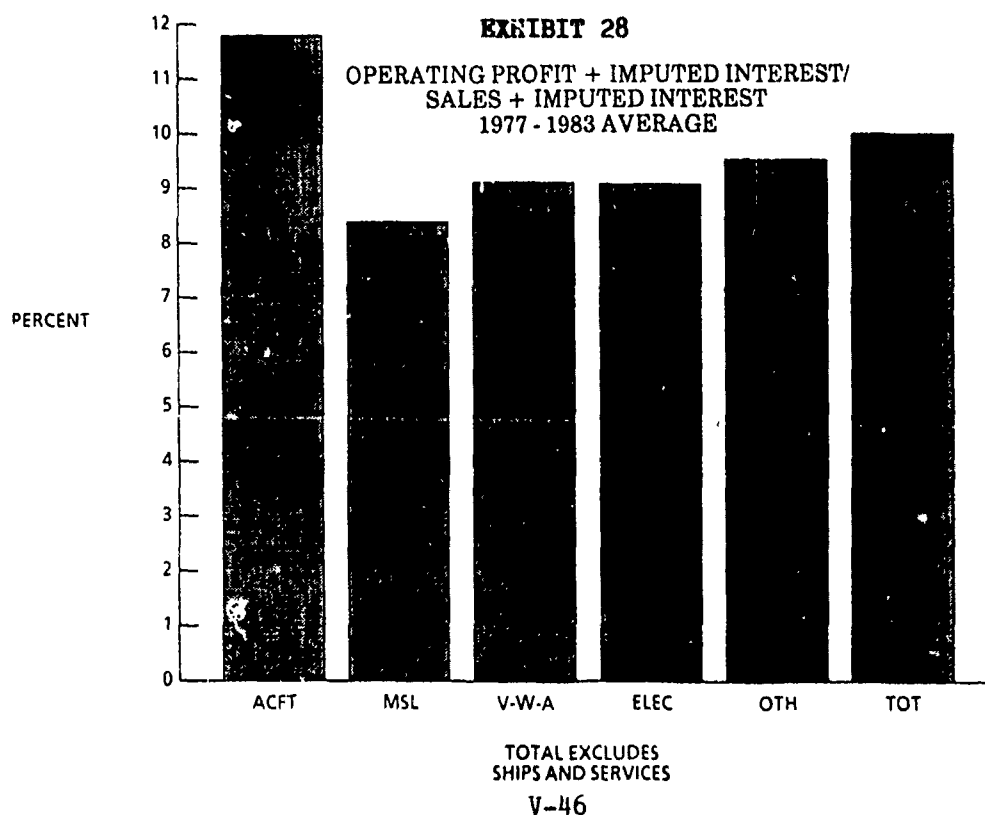
Based on the very similar returns on cost-type and fixed-price contracts, the Profit '76 study concluded that the returns were disproportionate and that there should be a greater difference in profitability because of the different levels of risk involved. Their recommendations resulted in higher risk weightings for fixed-price contracts, which should have resulted in higher profit rates on fixed-price contracts. Additionally, DAC 76-23 created separate Weighted Guidelines for manufacturing, R&D and service contracts. Manufacturing contracts are the most capital intensive and are rewarded with higher profit rates because the WGL policy rewards the application of capital. Since manufacturing contracts tend to be fixed-price, this change in policy should also have resulted in higher profit rates on fixed-price contracts.

Exhibit 27 shows that return on sales for cost-type contracts increased slightly to a three-year average of 5.0% for 1981 to 1983, while profitability for fixed-price contracts increased to a three-year average of 9.3%. However, the projected cost of the additional contractor-provided financing on fixed-price contracts is 1.9% of contract price, which would reduce profitability for fixed-price contracts to 7.4%. Thus, it appears that the policy revisions achieved the objective of widening the difference in profitability between fixed-price and cost-type contracts.

### PROFITABILITY BY PRODUCT GROUP

Financial data was collected from DoD contractors by segment, with segment data consolidated into product groups. The charts in this section are included to demonstrate the relative profitability among product groups. Therefore, only the DFAIR method of analyzing profitability has been presented. Shipbuilding and service contracts have been excluded from this analysis.

**Operating Profit + Imputed Interest/Sales + Imputed Interest:** Exhibit 28 presents average return on sales data by product group for the years since the implementation of Profit '76 recommendations. The average return on sales for the five product groups presented here was 10.1%. The product group which includes aircraft and aircraft engines was the most profitable, with a seven year average return on sales of 11.8%. Return on sales for the other product groups was: other equipment, 9.6%; vehicles/weapons/ammunition, 9.1%; electronics, 9.1%; and missiles and space systems, 8.4%.

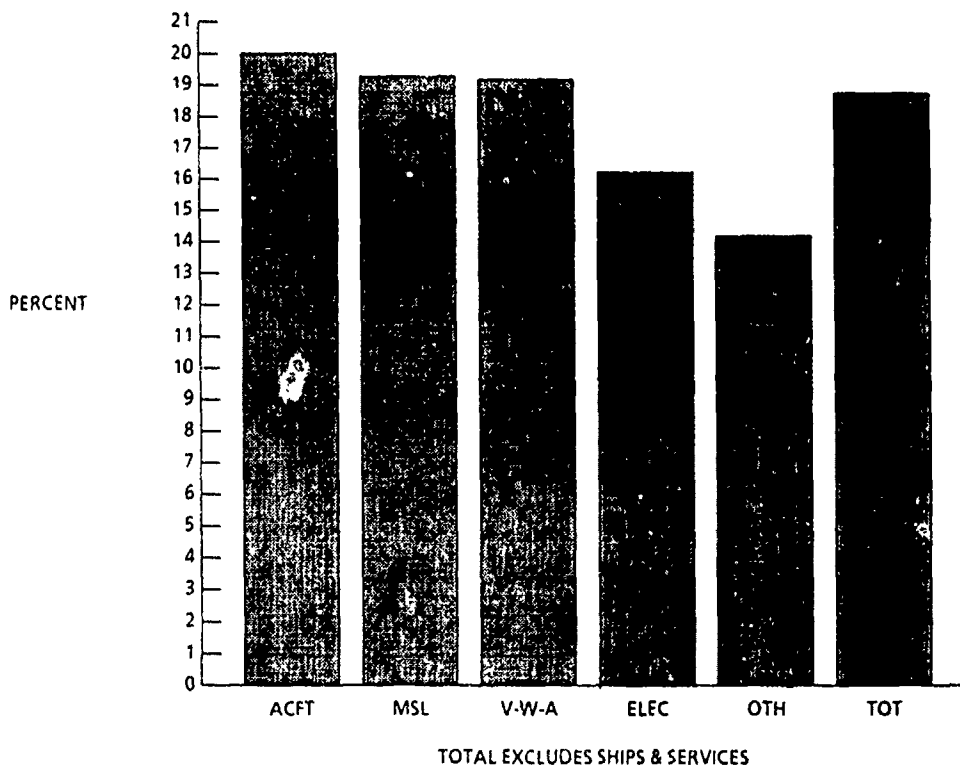


Source: Touche Ross

Operating Profit + Imputed Interest/Assets: Exhibit 29 shows that, using this measure of profitability, the seven year average for the five product groups presented here was 18.8%. Aircraft was the most profitable product group with a 20.0% return on assets, followed by missiles and space systems (19.3%), vehicles/weapons/ammunition (19.2%), electronics (16.3%), and other equipment (14.2%).

#### EXHIBIT 29

##### OPERATING PROFIT + IMPUTED INTEREST/ASSETS 1977-1983 AVERAGE

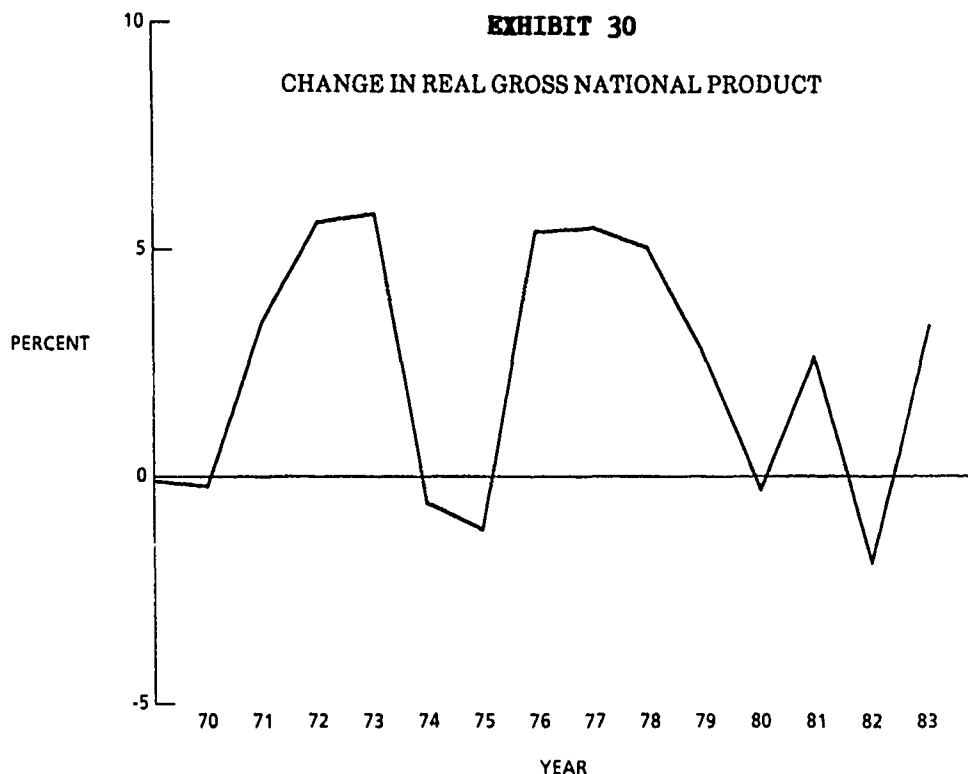


Source. Touche Ross



### EFFECTS OF BUSINESS CYCLE FACTORS

The major factor that complicates a comparison of profitability between the defense and nondefense sectors is the extremes of the business cycle experienced by the U.S. economy from 1970 to 1983. For example, the change in real gross national product (GNP), which is one of the best indicators of overall economic activity, varies from a negative 1.9 percent to a plus 5.8 percent. Exhibit 30 shows the change in real GNP from 1970 to 1983. Clearly the level of economic activity has varied greatly over the DFAIR sample period and profitability would have been significantly affected by these changes in overall business activity.

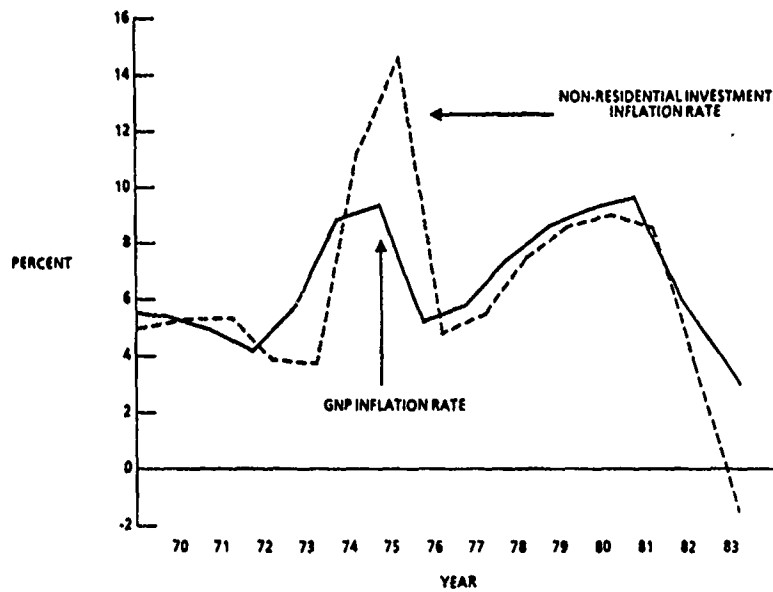


Source: Economic Report of the President

The inflation rate and the cost of borrowing, both of which strongly influence investment activity, also experienced dramatic extremes during the sample period. Exhibit 31 shows the rates of inflation from 1970 through 1983 for the economy in total and for nonresidential investments. Exhibit 32 shows the variations that have occurred in the domestic corporate bond rate for firms rated Aa from 1970 through 1983. Clearly there have been substantial changes in interest rates as well as an overall increase in their level. Since investment is usually funded through long-term borrowing, the potential negative effect on investment is clear. In addition, the inflation rate variations introduced a significant amount of uncertainty that would also have negatively affected investment and in all likelihood profits.

### EXHIBIT 31

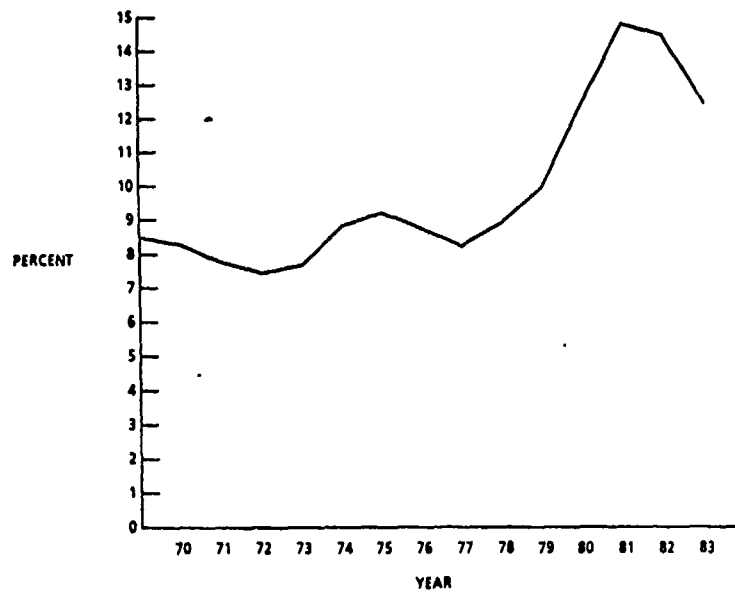
#### INFLATION RATES



Source: Economic Report of the President

### EXHIBIT 32

#### Aa BORROWING RATE

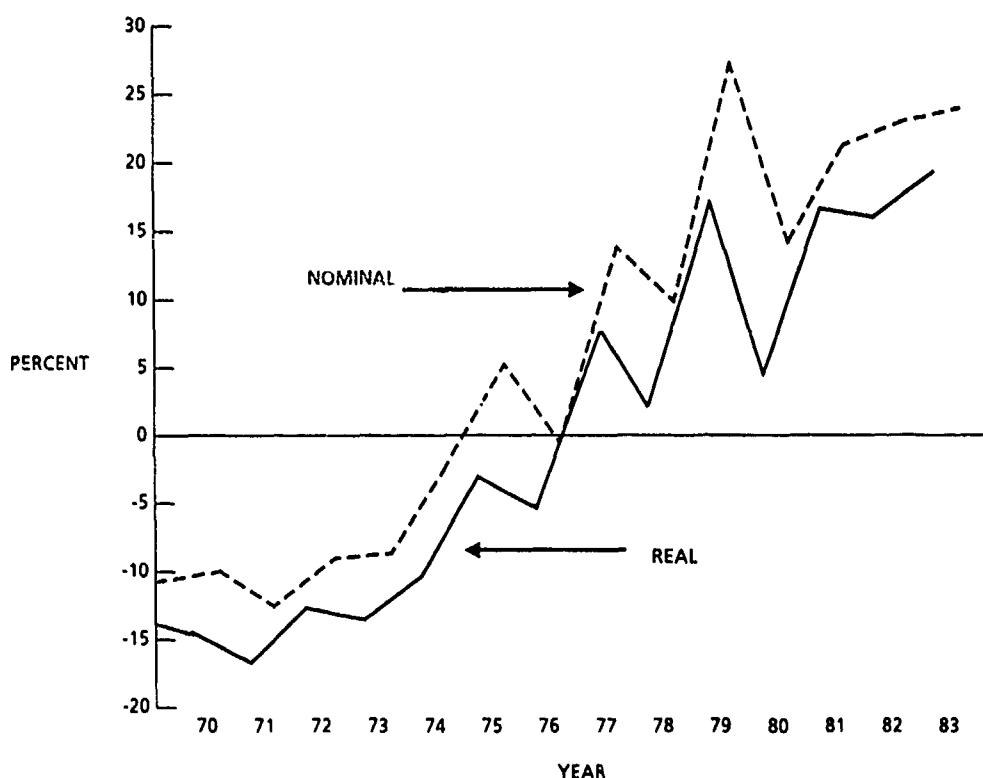


Source: Survey of Current Business

In comparison to the nondefense sector, defense related industries were experiencing a counter-cyclical increase in defense spending that started in 1977. Exhibit 33 shows the change in both nominal and real defense procurement outlays from 1970 through 1983.

### EXHIBIT 33

#### CHANGE IN PROCUREMENT OUTLAYS REAL AND NOMINAL

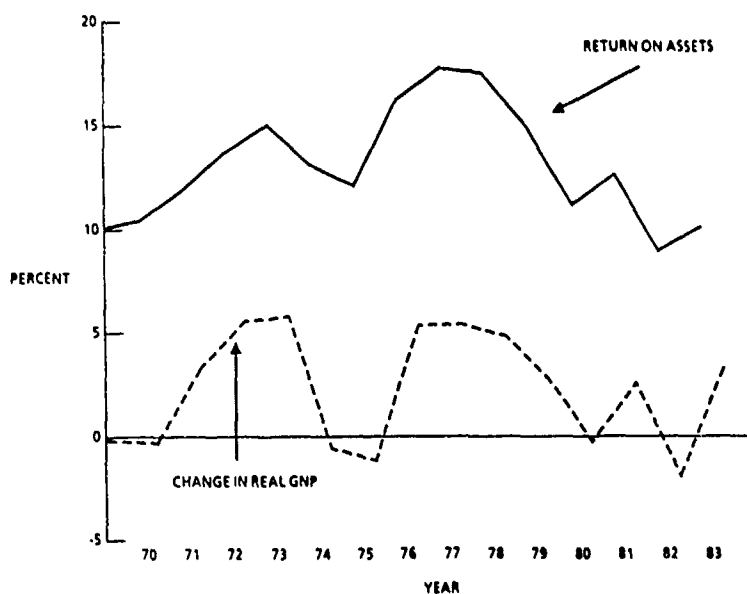


Source: National Defense Budget Estimates for FY 1985

The relationship of these essentially opposite business cycles to operating profits in the two sectors is presented in the next two exhibits. Exhibit 34 shows the changes in real gross national product and the operating profit to assets ratio for comparable durable goods industries. Exhibit 35 shows the change in nominal defense outlays and the operating profit to assets ratios for the DFAIR sample excluding ships and services. Graphically both relationships appear quite strong.

### EXHIBIT 34

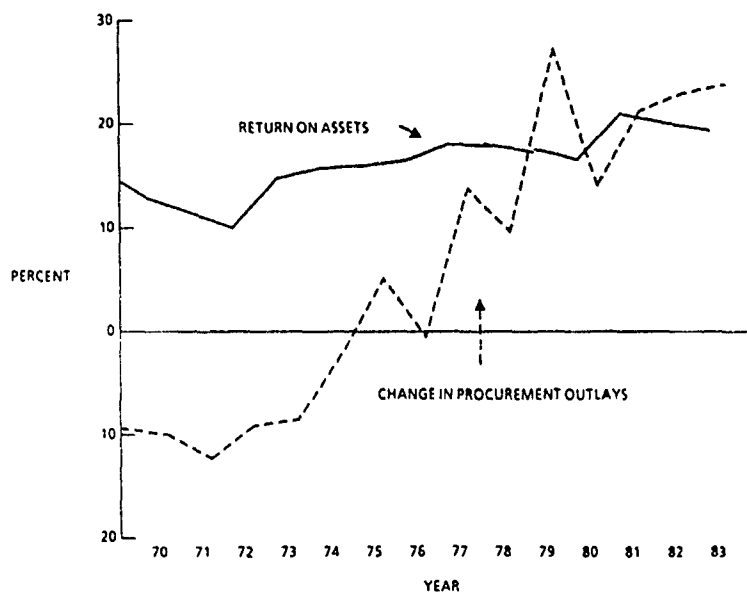
#### DGM RETURN ON ASSETS VS. CHANGE IN REAL GNP



Sources: Economic Report of the President; QFR

### EXHIBIT 35

#### DOD RETURN ON ASSETS VS. CHANGE IN PROCUREMENT OUTLAYS



Sources: National Defense Budget Estimates for FY 1985, Touche Ross

To confirm this, a multiple regression analysis was conducted to test the relationship between the change in defense outlays and operating profits for the DFAIR sample. Both the change in nominal and real defense outlays were strongly correlated with the operating profit to sales ratio and the operating profit to asset ratio. When both operating profit ratios were regressed against the change in real and nominal defense outlays as well as the change in real gross national product the defense outlay variables were found to be very significant, but the GNP variable was not significant.

In the case of the operating profit ratios for the comparable durable goods industries there was an insignificant correlation with defense outlays but a very significant one with the change in real GNP variable. The GNP variable was also confirmed to be very significant in multiple regression analysis. The effect of these opposite cycles on capital investment behavior is reported in the Investment Chapter.

The key point is that there were two separate business cycles occurring during the sample period that must be taken into account in any comparison of activity between the defense and nondefense sectors. To some degree, profits have varied between the two sectors because of these opposite cyclical effects, and not because of policy changes made by DoD. Consequently, any decision to alter profit and financing policies based on differences between profit rates in the two sectors must be tempered with the understanding that economic factors outside the control of administrative policies were also at work.

#### EFFECTS OF INFLATION

One factor which could substantially impact realized profit is the accuracy of inflation estimates priced into fixed-price contracts, especially contracts without economic price adjustment clauses. If the inflation projections used to price the different elements of cost underestimate the impact of inflation, profitability would be reduced. Conversely, if inflation is overestimated when a contract is priced, profitability would be increased.

If a contract is cost-type or contains an economic price adjustment clause, misestimating the rate of inflation should not affect the amount of profit. Exceptions would be through the impact of cost incentive provisions and inflation effects within adjustment bands contained in the economic price adjustment clauses. Errors in inflation projections would affect profits if there are costs within a contract not covered by the economic price adjustment clause, or if the contract is fixed-price without any inflation provision.

The majority of costs for many major systems contracts of several years duration are covered by economic price adjustment provisions. If, however, only a small percentage of the costs are not subject to economic price adjustment, the effect on profits can be substantial. To assess the potential impact of inaccurate inflation projections, it is first necessary to develop some idea of how great the error could have been. The most logical place to start is the inflation estimates used by DoD for budget preparation purposes.

Exhibit 36 shows the inflation estimates prepared by DoD one year prior to the fiscal year listed. For example, the estimate for Fiscal Year 1979 was prepared in January 1978. Different time lags for different contract negotiation and performance periods could be appropriate, but for this general assessment a one year lag was chosen. Data on inflation estimates used by DoD prior to 1979 was not available. The pattern shown in Exhibit 36 reflects the general decrease in inflation from 1981 to 1983 which was not anticipated in the year the inflation estimates were prepared since inflation trends had been much different.

**EXHIBIT 36**  
**INFLATION ERROR ESTIMATE**

	Estimated Inflation	Actual Inflation	Estimated Error
1979	6.1	8.6	-2.5
1980	6.4	9.2	-2.8
1981	8.4	9.4	-1.0
1982	9.8	6.0	+3.8
1983	6.9	4.2	+2.7

Source: National Defense Budget Estimates for FY 1985, dated March 1984 -  
Table 5-8

The actual misestimates would vary from contract to contract. Since detailed contract inflation assumption information is not available, an idea of the potential impact on the DFAIR sample was calculated using the differences found in the DoD projections. Since DoD inflation projection data was not available for the years prior to 1979, and because the DoD values are only an aggregate estimate of what the real errors could have been, no estimate of this inflation error on the overall DFAIR sample was made. Instead, two examples were calculated using very conservative estimates of the percentage of costs not covered by EPA clauses or cost-type contracts. Exhibit 37 shows an example calculated for 1982 using the total DFAIR sample data for that year.

**EXHIBIT 37**  
**POTENTIAL IMPACT OF INFLATION ERROR**  
**DFAIR SAMPLE**  
**1982**

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Forecast Inflation 9.8

Actual Inflation 6.0

Total Operating Costs	\$45,062.6	
<u>8%</u> Subject to Inflation Error	3,605.0	
Cost Base w/o Inflation (\$3605.0 divided by 1.06)	3,400.9	
Cost Base with Forecast Inflation (\$3400.9 x 1.098)	3,734.2	
	<u>-3,400.9</u>	
Inflation Error Contribution to Profit	333.3	
Operating Profit with Inflation Error	3,808.7	
Error Contribution	<u>- 333.3</u>	
	3,475.4	
Operating Profit to Assets Ratio	<u>3,475.4</u>	= 12.2
w/o Inflation Error Contribution	28,487.5	
Inflation Error Contribution to Profit Ratio	1%	

The assumption is made that only 8% of the total costs of all the contracts in the DFAIR sample in 1982 are not subject to EPA clauses or cost-type arrangements. The estimated error for that year still generates a one percentage point change in the operating profit to assets ratio. The same 8% assumption in 1983 generates a .8% change as shown in Exhibit 38.

**EXHIBIT 38**  
**POTENTIAL IMPACT OF INFLATION ERROR**  
**DFAIR SAMPLE**  
**1983**

---

Inflation Forecast 6.9

Actual Inflation 4.2

Total Operating Cost	\$52,630.5	
<u>8%</u> Subject to Inflation Error	4,210.4	
Cost Base w/o Inflation (\$4,210.4 divided by 1.042)	4,040.7	
Cost Base with Forecast Inflation (\$4,040.7 x 1.069)	4,319.5	
	<u>-4,040.7</u>	
Inflation Error Contribution to Profit	278.8	
Operating Profit with Inflation Error	4,964.0	
Error Contribution	<u>- 278.8</u>	
	4,685.2	
Operating Profits to Assets Ratio	<u>4,685.2</u>	= 13.5
w/o Inflation Error Contribution	34,718.1	
Inflation Error Contribution to Profit Ratio	.8%	

Clearly the potential impact is significant and could have been the cause of both higher and lower actual profit than anticipated during the DFAIR sample period.

It is important to note that in the nondefense sector inflation errors of this sort would probably not have resulted in the same impact on profits, especially positive effects. The competitive pressure to increase market share would have induced firms to reduce prices at the expense of some of the inflation error contribution to profit. Thus, the impact of misestimating inflation should not be as important in the nondefense sector as in the defense sector, where the same type of competitive pressure does not exist.

In all likelihood, inflation projection errors have had a significant effect on profits in the DFAIR sample. Due to data limitations in calculating the degree of error and its exact time lag, a precise assessment of its impact cannot be calculated at this time. But, as a source of differential between defense and nondefense sector profits, its likely influence should be noted.



## DEFENSE CONTRACTOR VS. COMMERCIAL FIRM PROFITABILITY & RISK

An additional comparison of defense contractor profitability with commercial firm profitability was made by using the Standard and Poor's COMPUSTAT data base. Companies in the COMPUSTAT data base are publicly traded on major exchanges or on the national over-the-counter market. The data available includes all financial statement entries, line of business and industry data.

A sample of defense and commercial companies was compiled based on the Standard Industrial Classifications (SICs) belonging to companies which were selected to participate in the DFAIR survey. The sample consisted of all companies in the COMPUSTAT data base which were found in these same SIC codes. The sample size was 214 companies covering 26 SIC codes. Of the total, 65 were classified as defense firms and 149 were classified as commercial firms serving non-DoD markets. The defense firms were also classified as low, medium or high defense depending on whether their DoD sales constituted less than one-third, one-third to two-thirds, or over two-thirds of their overall sales.

Defense firms were compared to commercial firms in various ways, including rates of return, measures of risk, and the relationship between return and risk. Ten years of historical data were used for all analyses, except for market return where 20 years of historical data was used.

### **Rates of Return**

Various measures of return were examined, including net income return on assets, net income return on stockholders' equity, net income return on sales, cash flow return on assets, cash flow return on stockholders' equity, and market return. The first five measures are accounting values from annual balance sheet and income statements. The sixth measure is market-oriented and is based on annual stock price appreciation plus dividends. When defense firms in the sample were compared to commercial firms in the sample, relatively consistent results were found which do not vary regardless of which measure of return is selected.

No differences were found in the ratios of net income to assets, to equity or to sales for defense contractors compared to commercial companies. When return on assets and return on equity were calculated using cash flow instead of net income, defense contractors showed higher returns than commercial companies. When market return (which is the sum of annual stock price appreciation from the beginning to the end of each calendar year plus the annual dividend, all divided by the beginning of the year stock price) is analyzed, defense firms and commercial firms experienced similar average market rates of return from 1965 to 1985.

## **Measures of Risk**

Risk was measured by the variability of returns over time based on the standard deviation about the mean rate of return. The sample of defense contractors never showed more riskiness than the commercial companies, except for one measure for one group. Defense contractors as a whole actually showed less riskiness for all measures except return on sales, where they were comparable to commercial firms.

## **Relationship Between Return & Risk**

The final analysis performed examined the relationship between return and risk to see if investors require different returns to assume equivalent risk for defense and commercial firms. The analysis was performed for four measures of return (return on assets, return on equity, return on sales, and market return), and for risk as measured by the standard deviation of return. Only one of these relationships conformed to anticipated investor behavior - higher returns associated with greater riskiness - and that was for market return. There are reasons to prefer the market-oriented measure over strictly accounting measures of profitability. Market return cannot be manipulated through changes in accounting conventions to give desired results. More importantly, stock price reflects investor anticipation of future returns discounted at a rate required by the investor to assume risk. Consequently, a change in investors' perceptions of future returns or riskiness will immediately be reflected in the market price.

Based on this analysis, the risk-return tradeoff is the same for defense and commercial firms. That is, since investors are apparently indifferent to whether a company performs defense or commercial work, they will require the same additional return for increased risk for investments in defense or commercial firms.

## **SUMMARY**

Demand in the defense industry depends primarily on the perceived defense needs of the nation. Individual contractors cannot meaningfully alter this demand. Because the current markup policy is still an essentially cost-based policy, defense contractor profitability will be strongly influenced by fluctuations in the level of defense sales. As the volume of defense business increases, so will profits. Return on sales will not fluctuate because of changes in demand (although ROS will fluctuate due to changing economic conditions, such as variations in interest rates and inflation rates, and other factors such as more fixed-price contracting), but return on assets will fluctuate, assuming that asset levels remain relatively constant.

The current markup policy has been approximately 70% cost-based and 30% investment-based since DAC 76-23 was issued. As a result, some of the disincentive toward investment and incentive to keep costs high which existed under the previous markup policy has been removed. However, improvements can

be realized by increasing the investment-based portion and reducing the cost-based portion of markup, which would further insure that cost reductions and investments would not be discouraged. This would also help to separate profitability from fluctuations in DoD demand. Additionally, if different markup weights were applied to investments with different benefits to DoD, then productivity-enhancing investments would be encouraged.

Based on the data analyzed, defense economic profits were very similar to those of comparable durable goods manufacturers for the years 1970 through 1979. During the severe recessionary period of 1980 to 1983, however, profitability of durable goods manufacturers deteriorated dramatically, while defense profitability on average decreased slightly.

### CONCLUSIONS

Several conclusions on changes which should be made to the markup policy have been addressed in this chapter. They are briefly restated here.

- o Increased markups of .5 to 1 point resulting from DAC 76-23 were unintended.
- o The current markup policy should be simplified.
- o The facilities capital employed portion of the Weighted Guidelines should be modified to provide different markup weights for assets based on their relative productivity levels.
- o Markup weight ranges should be narrowed to create more widely dispersed markup outcomes.
- o Because it is extremely difficult to predict changes in the business cycle and in inflation rates, a policy should be established for the use of economic price adjustment clauses in selected instances.
- o The use of special factors included in the Weighted Guidelines have created more problems than solutions and should be eliminated.

Additionally, certain problems were identified during the study which should be corrected. They are briefly stated below:

- o The current DD Form 1499 should be simplified and the Services should insure that all forms are submitted in compliance with written procedures.
- o Financial information should be obtained from defense contractors periodically to enable DoD to monitor profitability on a regular basis.

## RECOMMENDATIONS

- o Reduce markups by .5 to 1 point. This change could be accomplished in several ways: eliminate G&A from the markup base (along with G&A related cost of money and facilities capital employed); reduce FCE markups back to the DPC 76-3 level of 6-10%; or make cost of money an unallowable cost.

The recommended alternative is to eliminate G&A from the markup base because this adjustment would remove any incentive that may exist in the current markup policy for contractors to increase these costs just to obtain higher markups. Eliminating G&A from the markup base will also reduce the cost-based portion of markup and therefore increase the investment-based portion.

If FCE markup was reduced or COM was eliminated, the investment-based portion of markup would decrease.

- o Simplify the current markup policy. This change could be accomplished in several ways:
  - 1) Replace the 30% offset factor with reduced weightings in the CITP sector of the WGL.
  - 2) Eliminate the R&D and service WGLs. Use the revised WGL for all contracts.
  - 3) Combine the cost breakout in CITP so that the present eleven elements are combined into three: material, labor, and overhead.
  - 4) Eliminate the use of special factors in the WGL. This change would simplify the markup policy and remove any possibility that the use of such factors could counteract policy goals. The existing special factors are rarely used, but when they are used, very large adjustments to the markup objective may result.

Each of these changes is recommended.

- o Reward assets based on their contribution to productivity. The current markup policy applies the same reward to all fixed assets. Thus, if a contractor invests in land, buildings, or cost-reducing equipment, the markup will be the same. By discriminating between categories of assets and awarding a markup factor based on the benefits to be received from the asset, DoD would have a more rational policy which expresses a preference for types of investments with cost-reducing potential.

An approach which was proposed in 1971 by the Industry Advisory Council Subcommittee to Consider Defense Industry Contract Financing provides a rational basis for constructing such a markup system:

- Allow imputed interest on all capital employed including working capital. Since it is administratively practical to treat facilities cost of money as an allowable cost, that practice should be continued. Due to the administrative difficulty of allocating imputed costs of working capital to contracts, a much more simplified approach to calculating these costs should be developed to be used as part of the markup policy.
- Structure a risk and capital preference reward for buildings and machinery/equipment. The reward should be structured so that the weight on machinery/equipment would encourage investments in cost-reducing items and would be significantly higher than the weight on buildings.

This approach should be combined with a reduced weight for the cost-based portion of markup, resulting in a markup policy which is more investment based.

- o Narrow the weight ranges for the CIP factors. This recommendation is also related to simplifying the current markup approach. It should result in more variation in markup objectives.
- o Establish more precise criteria for the use of EPA clauses. Changes in inflation rates are very difficult to forecast. Unfortunately, forecasts which err by only a few percentage points can substantially impact profitability in the defense sector. As recent experience has demonstrated, forecasts tend to underestimate the size of both inflation increases and decreases which are unusually large. DoD has attempted to eliminate EPA clauses from contracts as soon as inflation begins to decline. Therefore, they are never able to benefit from EPA clauses.

A set of criteria mandating the use of EPA clauses should be established for long-term high value contracts which have a significant portion of their costs subject to inflation uncertainty.

## CHAPTER VI

### INVESTMENT

#### INTRODUCTION

One of the primary concerns of Department of Defense acquisition policy makers over the last ten years has been how to structure DoD contracting and financial policies to encourage new capital investment by defense contractors. There were four primary bases for this concern:

- o The empirical conclusion of DoD's Profit '76 study that DoD contractors employed approximately 42 percent as much facilities capital per dollar of sales as did durable goods manufacturers.(4) Facilities capital in this context refers to the remaining or net book value of tangible and intangible capital assets subject to amortization, and assigned to defense related operating segments or divisions.
- o The contention by defense contractors, and the belief of the majority of DoD acquisition personnel, was that DoD contract pricing policies contained investment disincentives.(4) The two primary disincentives were the cost basis of profit calculations and the non-recognition of the cost of facilities capital as a contract cost element.
- o An overall concern for the health of the defense industrial base and its potential ability to meet production and mobilization surge requirements.(2) It was generally felt that unless something was done to encourage new investment and modernization by defense contractors that there would be an inadequate surge capability. While this problem was determined to be more critical in some industries than in others, the overall conclusion was that DoD contract policies should be altered to specifically address this problem.
- o The escalating cost of major weapon systems which was often attributed to the age and productivity of the plant and equipment used by many defense contractors.(32)

Each of these problems was voiced and corroborated in testimony before Congress and in numerous articles and books both prior to the Profit '76 study and again in 1980 during the Defense Industrial Base hearings.

Three steps were taken by DoD to address these problems. The first was to alter the profit calculation methodology to recognize facilities capital as an element of profit. This action was taken in 1976 with the aim of offsetting profit reductions which resulted from cost reductions by rewarding increases in facilities capital employed.(4) In 1980 this profit policy change was modified to concentrate on production contracts.(29) The second step was the initiation of various manufacturing technology programs to encourage and reward productivity enhancing research and technology. Finally

there were certain aspects of the Acquisition Improvement Program that also addressed the need for modernization and productivity improvements.(3)

Relative to the DFAIR study, the key question is whether or not these policy changes have resulted in increased capital investment and increased capital employed by defense contractors. To determine specifically whether or not these policies have had their desired effect is difficult because the predicted effect of their implementation was implicitly based on the assumption that no other factors that affected investment behavior would change. These other factors, or determinants of investment, include the rate of inflation, the interest rate, changes in the level of aggregate demand or sales, tax policies, expectations or uncertainty concerning future demand levels, and technological change. There also seemed to be an implied assumption that changing profits alone would be sufficient to at least alter if not actually determine investment behavior.

Clearly none of these other determinants has remained constant over the last ten years. In fact, some of these determinants have had both a positive and a negative effect on investment during this time period. For example, the inflation rate has gone from record high levels, which certainly would tend to discourage investment because of increased uncertainty, to relatively low levels recently. These determinants could both counteract and reinforce DoD investment policies. There is also the possibility of conflicting policy effects. For example, the goal of the manufacturing technology programs is to enhance productivity and efficiency through improved manufacturing techniques. This could result in less and not more capital investment than would otherwise have taken place.

The existence of these factors just noted, while important, does not imply that a meaningful analysis cannot take place. In fact, there are many important and significant data items to investigate, and several hypotheses to test. Six different data sources and studies performed for the DFAIR study group were used to investigate whether or not defense contractors have responded to the policy changes described above by altering their investment behavior. Several different analyses have been conducted. The final section of this chapter is devoted to a discussion of the conclusions that have been reached from the empirical analysis that has been conducted. A set of policy recommendations is also provided.

## **POLICY HISTORY**

The first specific reference to investment disincentives built into the then current DoD profit policies was in the Report of The Industry Advisory Council Subcommittee to Consider Defense Industry Contract Pricing, dated 11 June 1971. The report noted that DoD markup policies acted as a constraint on capital investment, and maintained that there was an inverse relationship between the percent of government business and investment in capital facilities. One of the recommendations of this report was to recognize contractor investment in determining markup objectives.

In 1972 Defense Procurement Circular No. 107 was issued. The purpose of this new policy was to establish a method to base markups on return-on-investment. A major problem with DPC 107 was its complexity and it was phased out in 1975.

Concerns about the level of capital investment in the defense sector continued following the issuance of DPC 107, resulting in the formulation of the full scale review of DoD profit policies commonly referred to as Profit '76. Its primary conclusion was that significant productivity gains could be attained if defense contractors were to increase their level of capitalization. To encourage this increase in capital intensity DoD issued DPC 76-3 in September 1976. In 1980, DPC 76-3 was revised by DAC 76-23 to provide more emphasis on manufacturing contracts. The primary aim of both DPC 76-3 and DAC 76-23 was to achieve productivity improvements and cost reductions through increased capital investment. The investment determinant at which they were aimed was the rate of return or profit.

DoD has also been attempting to encourage increased capital investment through its Acquisition Improvement Program. Acquisition Improvement Program Initiative 5 is directly concerned with the encouragement of capital investment and there are several other actions that are indirectly related. The specific actions under Initiative 5 include the use of flexible progress payments when appropriate, and the authorization of the test of the Industrial Modernization Incentive Program (IMIP) on 2 March 1982. The contract incentives being tested under IMIP include shared savings rewards and contractor investment protection in the case of early program termination. There are currently several programs being implemented under IMIP. Also included under Initiative 5 is the Manufacturing Technology Program aimed at improving overall productivity on defense production programs.

Three Acquisition Improvement Program Initiatives are aimed at increasing capital investment in an indirect manner. These are Initiative 3: "Multiyear Procurement," Initiative 4: "Program Stability", and Initiative 32: "Increased Competition." At least partial implementation of these actions has served to create a climate of greater program stability and competition which tends to encourage capital investment. There have also been programs initiated by the Services such as the Air Force's "Get Price" program.

#### INVESTMENT THEORY

One of the most thoroughly investigated and yet hotly debated areas of economic theory is that of business fixed investment. The economic literature abounds with both empirical and theoretical attempts to explain the primary factors that determine investment in new capital equipment and structures. The primary reason for this continuing interest is that without net increases in the capital stock there can be no increase in productive capacity which is required for economic growth. Most of the empirical and theoretical attempts at explaining investment behavior are aimed at developing models that can be used to provide guidance in the setting of policies, especially tax policies, intended to encourage new investment. The two essential questions



that must be addressed are what models or variables best explain business fixed investment behavior, and what policies are the most likely to be the most effective.

Both the level and growth of business fixed investment has been a major concern of each administration since the late 1960's. The primary investment policy used has been changes to the corporate tax code, especially those parts of the code concerning depreciation and tax credits for new investment. The latest examples of this type of policy approach are the Economic Recovery Tax Act of 1981 and the 1982 Tax Equity and Fiscal Responsibility Act. The 1981 Act shortened the period over which assets can be depreciated and also liberalized investment tax credits for certain types of capital equipment. The 1982 tax act revised the accelerated depreciation rules to reduce the depreciation allowances somewhat by requiring firms to take the applicable investment tax credit into account in calculating the depreciation deduction.

The primary investment factor that these most recent tax policies were aimed at is the cost of financing new capital expenditure. This financing cost is best summarized in a variable called the cost of capital, which is the tax adjusted real interest rate faced by a firm which borrows to finance an investment project. Without detailing the mathematics of how the user cost of capital is calculated, the concept is that the borrowing rate, say the Aa corporate bond rate, must be adjusted for the affects of the corporate tax laws, inflation, and economic depreciation. Specifically the fact that interest costs are tax deductible must be considered, as must the effects of tax depreciation allowances, tax credits, and the true economic depreciation. The effective result of the 1981 Tax Act was to lower the cost of capital. Implicit in the use of this type of policy instrument is the assumption that the cost of financing, and consequently the interest rate, is an important determinant of investment activity. The assumption is also made that there is an inverse relationship between the cost of capital and capital expenditures. This implies that firms will respond to decreases in their net borrowing costs by investing in new equipment and structure, other factors held constant. Whether or not this assumption is correct is a matter for empirical investigation.

Most of the empirical work published in the economic literature is aimed at determining the best model to use to predict investment behavior, and to also identify the most significant of the variables that influence investment activity. The most notable of these variables, often called the determinants of investment, include the cost of capital and consequently the interest rate, changes in output or sales, anticipated profits, the cost of equity financing, technological change, the relative prices of capital and labor, the current level of capacity utilization, and positioning for long-range market strategies. Dhrymes and Kurz in their 1967 article on investment determinants published for the National Bureau of Economic Research made a point that is still quite valid today.(31) They pointed out that a firm's investment decision is not an independent one, but rather one of several simultaneous decisions taking into account many diverse factors. In fact, it is even more complicated than that, because the decision process and the relative importance of different factors will in all likelihood vary from firm to firm.

Empirically it is difficult, if not impossible, to measure the influence of some of these variables, such as technological change and long-range market strategies. What has primarily been done by empirical investigators is to use multiple regression analysis to test different models that capture most of these investment determinants. The results of these tests are then used to identify the more significant variables which policy should be structured to influence. While there has been no shortage of models put forward, there are essentially four major model types that in effect sum up the different theories of investment behavior. These four models are the accelerator model, the liquidity model, the neoclassical model, and the securities value model. The securities value model was not used due to firm data confidentiality constraints.

- o The accelerator model relates capital expenditures to changes in output or sales, which is assumed to require some proportional variation in capital stock. This change in required or desired capital stock caused by the change in sales then leads to new capital investment. The policy implication of this model is that new investment is primarily a function of sales or output, and that attempts to influence other factors such as the cost of borrowing and profits may not be productive.
- o The liquidity model postulates new capital expenditures as a function of profits or cash flow. There are two theoretical concepts in this formulation. The first is that profits convey information about the future profitability of a firm and its future output path. The second is that internal funds should be less costly than external financing due to capital market information imperfections. The policy implication of this model is that new investment is primarily a function of profits and liquidity and that policies should be aimed at influencing those variables.
- o The neoclassical model relates capital expenditures to the cost of capital via a desired capital stock variable. The cost of capital used is the tax adjusted gross of economic depreciation rate of interest. The policy implication of this model is that the relative price of capital and labor is the primary factor influencing investment, and that policies should be directed at influencing the cost of capital, as was the 1981 Economic Recovery Tax Act.

The accelerator, liquidity, and neoclassical model frameworks were used to formulate part of the empirical investigation conducted in this study. Variations on each of these models were tested using the aggregate DFAIR sample data to identify the best models and the most significant investment variables for defense related businesses.

## Empirical Results

Since one of the primary concerns of this study is whether or not defense contractors have increased their investment levels, the logical first data item to investigate is capital expenditures. Exhibit 1 shows the total capital expenditures for both the DFAIR data set and the comparable durable goods manufactures on both a current and a deflated basis.

### EXHIBIT 1 CAPITAL EXPENDITURES

<u>Year</u>	<u>DFAIR DATA</u>		<u>DFAIR DATA</u>		<u>DURABLE GOODS MANUFACTURERS</u>	
	<u>All Product</u> <u>Codes</u>	<u>All Product</u> <u>Codes (Deflated)*</u>	<u>Excluding Ships</u> <u>&amp; Services</u>	<u>Excluding Ships</u> <u>&amp; Services (Deflated)*</u>	<u>Nominal</u>	<u>Deflated*</u>
1975	682.2	516.0	482.9	365.3	18425.3	13937.4
1976	696.6	502.6	534.2	385.4	19575.5	14123.7
1977	831.6	568.4	731.8	500.2	24933.6	17042.8
1978	1171.9	745.5	1056.5	672.1	29664.6	18870.6
1979	1609.2	942.1	1413	827.3	33911.5	19854.5
1980	2224.6	1194.7	2070	1111.7	39417.9	21169.6
1981	2672.8	1323.8	2503.4	1239.9	44745.9	22162.4
1982	3178.8	1515.9	3028.1	1444.0		
1983	3397.0	1641.8	3093.1	1494.9		
1975-1983 Annual Growth Rate			1975-1983 Growth Rate		1975-81 Annual Growth Rate	
22.22			26.13		15.94	
1978-1983 Annual Growth Rate			1978-1983 Growth Rate		8.04	
23.72			23.97			
15.57			19.26			
17.10			17.34			

\*Implicit price deflator for total nonresidential investment - 1972 Base Year.

Sources: Touche Ross  
QFR

A comparison of the annual growth rates between the DFAIR data set and the comparable durable goods manufacturers reveals two findings. The first is that capital expenditures in the defense related industries grew at a rate substantially higher than that of the nondefense sector, at least prior to the 1981 tax cut discussed above. Data for the comparable durable goods manufacturers were not yet available from the Census Bureau for 1982 and 1983. The second finding is that neither adjusting for inflation nor excluding ships and services altered the conclusion that capital investment increased faster in the defense related sector. It should be noted that data from other sources indicates that capital expenditures have increased rapidly in 1982 and 1983 for the economy in total.(30) This implies that the growth rate including 1982 and 1983 may not be as significantly different as indicated in Exhibit 1, but there can be no doubt that there has been a substantial increase in real capital expenditures over the last ten years by defense related industries as reflected in the DFAIR sample. Capital expenditure data were not gathered in the Profit '76 Study, so no comparison can be drawn for that time period.

As a check on the findings revealed in Exhibit 1 capital expenditure data at a corporate level were gathered from the Compustat Data Base for those firms in the DFAIR sample that are included in that data base. The total capital expenditure dollars for these firms on both a real and a nominal basis is shown in Exhibit 2.

**EXHIBIT 2**  
**CORPORATE LEVEL CAPITAL EXPENDITURES**  
**(THOSE DFAIR FIRMS IN THE COMPUSTAT DATA BASE)**  
**(MILLIONS OF DOLLARS)**

	Current Dollars	Deflated (1972 Base Year)*
1975	20,450.7	15,469.5
1976	21,619.2	15,595.4
1977	27,019.2	18,468.4
1978	33,365.5	21,224.9
1979	40,875.4	23,931.8
1980	47,866.7	25,707.1
1981	51,758.2	25,635.6
1982	45,802.5	21,841.9
1983	39,155.7	18,924.9

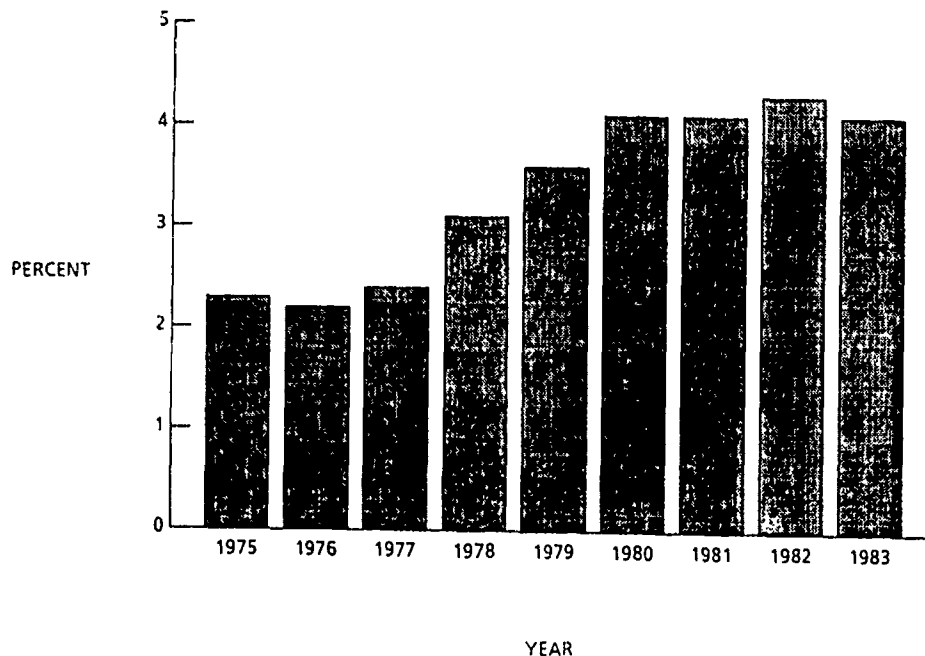
1975-1983 Annual Growth Rate

8.46	2.44
1978-1983 Annual Growth Rate	
3.25	-2.27

\* Implicit price deflator for total nonresidential investment.

A comparison of the corporate level expenditures to those in the DFAIR sample shows that capital expenditures in the defense related segments of those corporations grew at a substantially faster rate than the corporations in total. It should be noted that the two samples are not completely comparable since the Compustat Data Base does not contain all the firms in the DFAIR sample (53 of the 76 firms). But, as a check, it serves to confirm the trends found in Exhibit 1. Exhibit 3 displays the capital acquisition to sales dollar ratio of the DFAIR sample.

**EXHIBIT 3**  
**CAPITAL ACQUISITION TO SALES DOLLARS**



Source: Touche Ross

Again, the clear pattern of an increase in capital expenditures emerges.

A second data item that directly reflects the amount of capital investment on the part of defense related contractors is the ratio of facilities capital employed (FCE) to sales. This ratio indicates the level of capital intensity of businesses, and its trend is an indicator of investment behavior. When the ratio increases over time, a more intensive use of facilities capital is indicated. A constant ratio over time indicates a rate of investment just adequate to keep up with business activity, and a declining ratio indicates a decrease in capital intensity.

An increase in the facilities capital to sales ratio would be an indicator that a firm or sector of the economy had become more capital intensive. But, a decline would not necessarily mean that there had been inadequate investment because the increased productivity of new capital equipment could allow the sales base to increase more rapidly than capital expenditures. It also does not reflect improvements in the quality of new capital equipment which would increase productivity and output without requiring a one-for-one replacement of older equipment. Increases in quality would tend to depress this ratio. An increase in this ratio would be necessary if the goal of the DoD pricing policy changes was to specifically alter the level of capital intensity in defense related industries. But, the primary thrust of the policy changes was to remove investment disincentives, and to encourage capital investment and productivity increases.

Exhibit 4 compares the facilities capital employed to sales ratio of the DFAIR sample to that of the comparable durable goods manufacturers (DGM) on a nominal basis. In both cases, the level of capital intensity has increased, but the increase has been more dramatic in the defense related industries. In 1975 the defense FCE to sales ratio was less than half the DGM ratio, while by 1983 it had risen to more than half the DGM ratio. The degree of capital intensity in the DFAIR sample increased by 4.29 points, while that of the comparable durable goods manufacturers increased by 3.07 points.

**EXHIBIT 4**  
**DFAIR VS DGM FCE/SALES RATIO**  
**EXCLUDING SHIPS & SERVICES**

	SALES	DFAIR FCE	RATIO	SALES	DGM FCE	RATIO
1975	17,036	1470.3	8.63	381,751	76,740	20.10
1976	19,595	1680.6	8.56	433,175	79,455	18.34
1977	21920.5	1853.8	8.46	484,177	85,171	17.59
1978	21363.5	2095.1	9.04	553,647	96,776	17.48
1979	26049.8	2552.3	9.80	649,652	113,090	17.41
1980	30896.2	3265.7	10.57	639,514	131,619	20.58
1981	38784.1	4361.4	11.25	714,636	154,001	21.55
1982	48871.3	5860	11.99	687,058	170,349	24.79
1983	57594.5	7442.8	12.92	738,544	171,085	23.17

1975-83 Annual Growth Rates

16.45	22.47	5.17	8.60	10.54	1.79
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1978-83 Annual Growth Rates

19.98	28.86	7.40	5.93	12.07	5.80
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Sources: Touche Ross  
QFR

Exhibit 5 presents the same data, only on an inflation adjusted basis. Again, the growth in the capital intensity ratio has been substantially greater in the defense sector than in the comparable durable goods industries, but so has the rate of sales growth. In fact, on a real basis, the defense related capital intensity measure grew by 8.39 points from 1975 through 1983, while the nondefense sector grew by only 2.07 points. It should be pointed out that these real values are quite sensitive to the deflators used, especially since the FCE values reflect a stock value and are not current expenditures. The FCE base was deflated using an implicit capital stock deflator obtained from the Bureau of Economic Analysis that takes into account the effects of inflation on replacement costs and the overall capital stock age. Sales were deflated using an implicit price deflator for DoD procurement less fuel for the DFAIR values, and the GNP implicit price deflator for the DGM values. Even noting this deflator sensitivity does not alter the fact that these inflation adjusted values confirm the trends identified in Exhibit 4.

**EXHIBIT 5**  
**DFAIR VS DGM FCE/SALES RATIO**  
**(ADJUSTED FOR INFLATION)**

Excluding Ships & Services						
DFAIR DEFLATED				DGM DEFLATED		
Sales <sup>1</sup>	FCE <sup>2</sup>	Ratio		Sales <sup>3</sup>	FCE <sup>4</sup>	Ratio
1975	13521	1569.1	11.6	303,483	81,899.7	27.0
1976	13799	1687.3	12.2	327,320	79,763	24.4
1977	14811	1748.9	11.8	345,828	80,350	23.7
1978	14568	1837.8	12.6	368,067	84,891.2	23.1
1979	15058	2075	13.8	397,535	91,943.1	23.1
1980	16008	2474	15.4	358,432	99,711.4	25.6
1981	18039	3071.4	17.0	366,217	108,451.4	29.6
1982	19866	3906.7	19.7	332,105	113,566	34.2
1983	21490	4740.6	22.1	342,966	108,971.4	31.8
			1975-83 Growth Rate			
5.96	14.82	8.39		1.54	3.63	2.07
			1978-83 Growth Rate			
8.09	20.87	11.89		-1.40	5.12	6.60

1. Deflated by DoD procurement less fuel implicit price deflator.

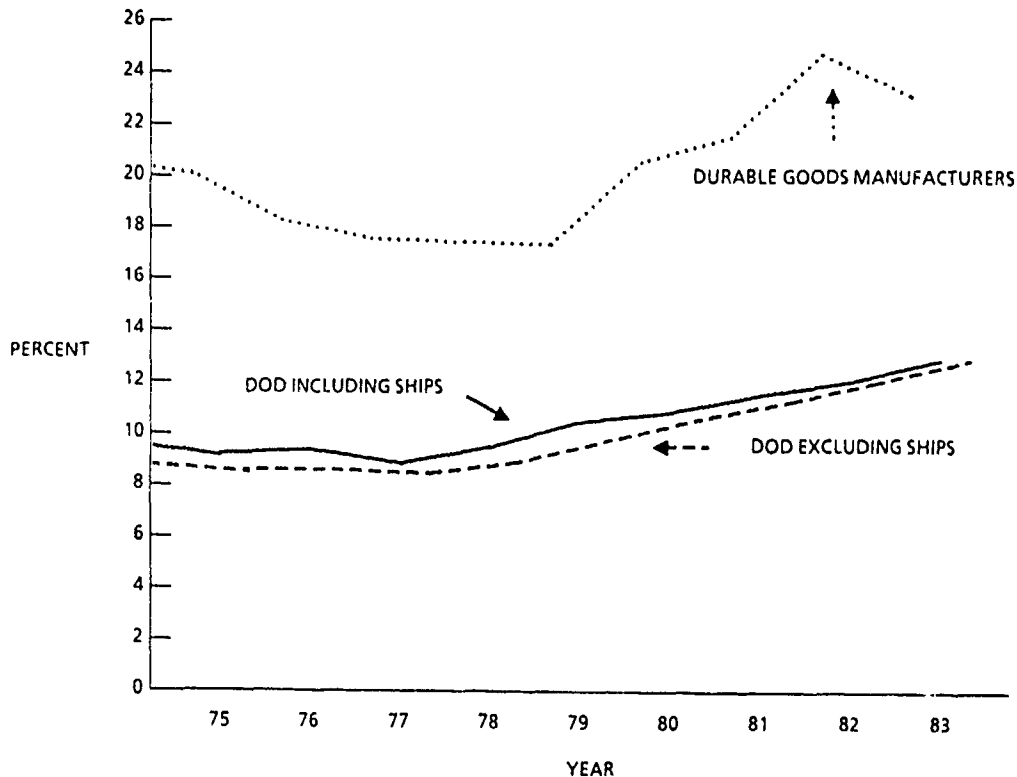
2. & 4. Capital stock deflator - Source: Bureau of Economic Analysis

3. Deflated by GNP implicit price deflator

Exhibit 6 compares the FCE to sales ratio of the total DFAIR sample, the DFAIR sample excluding ships and services, and the comparable durable goods manufacturers, on a nominal basis. The steady increase in the defense related FCE to sales ratio is quite evident, though slightly lower when ships are excluded.

## EXHIBIT 6

### FACILITIES CAPITAL EMPLOYED/SALES



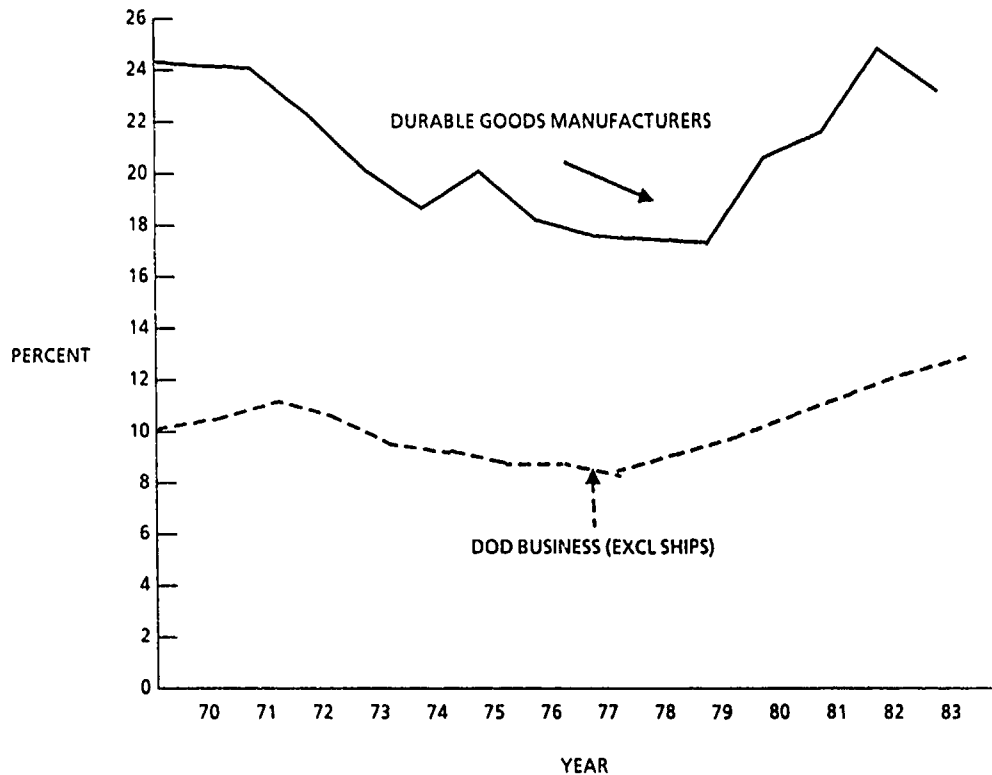
Sources: Touche Ross; QFR

Exhibit 7 includes the FCE to sales ratio calculated in the Profit '76 study appended to the DFAIR sample in comparison to the DGM ratio. Because of sample differences appending the Profit '76 ratio to the DFAIR ratio is not totally correct, but the overall comparison is still valid.



## EXHIBIT 7

### FACILITIES CAPITAL EMPLOYED/SALES

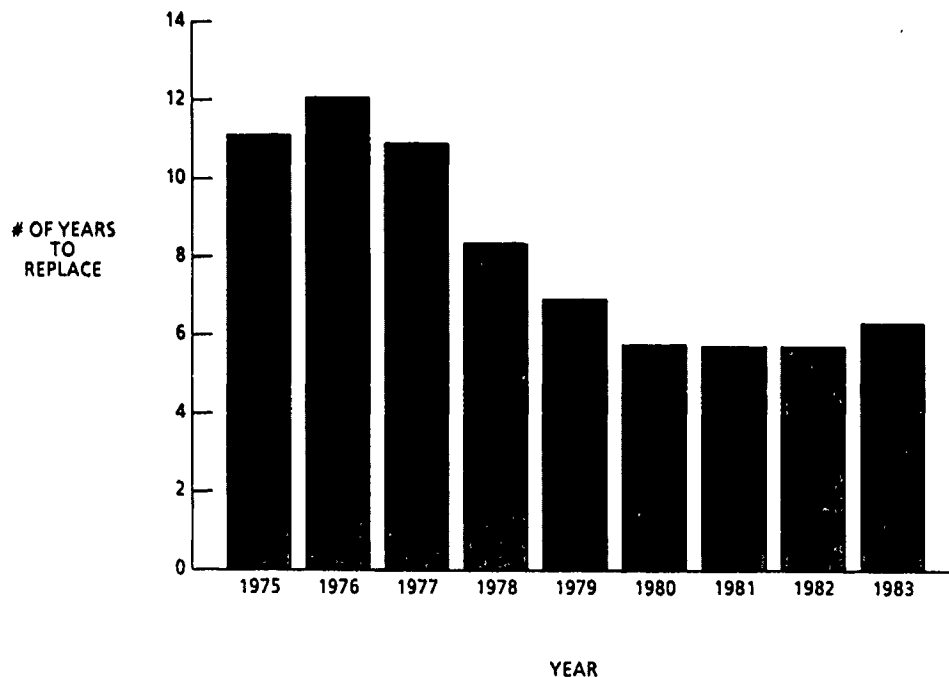


Sources: Touche Ross; QFR

The defense related ratio remains relatively steady until 1978 when it starts to increase at a substantial pace. The DGM ratio behavior is much more volatile largely because of changes in the sales base rather than the FCE value. Theoretically, 1978 is about when the profit policy changes should have started to take effect, but that was also the time when the DoD procurement budget started to rise more rapidly. In 1981, there were also the investment tax changes discussed earlier. Structural change tests to try and isolate the effects of the policy shifts are reported in the regression results discussion below.

Exhibit 8 shows the rate of asset replacement for the DFAIR sample. A decline in this rate indicates that firms are replacing their assets at a faster rate.

**EXHIBIT 8**  
**RATE OF ASSET REPLACEMENT**



Source: Touche Ross

Again, there is clear evidence that defense contractors have increased their level of capitalization. They now tend to replace older equipment at a much faster rate.

As part of the DFAIR study effort, the Logistics Management Institute (LMI) conducted a study of facilities capital investment by defense contractors. Their primary data base was assembled from a sample of "Cost of Money Factor" (CMF) forms used by DoD to pay cost of money pursuant to CAS 414. They also assembled data from DD Forms 1499, Report of Individual Contract Profit Plan, and published company annual reports. They collected data for the years 1978 and 1982 and compared the facilities capital employed to sales ratio between the two years. Exhibit 9 shows their results, including a breakout of the CMF data between the AFSC Profit '82 sample and their own larger sample.

**EXHIBIT 9**  
**FACILITIES CAPITAL EMPLOYED/SALES**

CMF Forms	FCE to Sales Ratio		Average Annual Growth
	1978	1982	Rate: 1978 - 1982
"Profit '82" Sample	5.76	9.74	14.0
LMI Sample	13.51	14.14	1.1
Combined Sample	10.79	12.69	4.1
DD 1499's-Contracts Using WGL and Cost of Money	8.68	9.87	3.3

Source: LMI

LMI also broke their sample of CMF data out by product line and size of segment. Exhibit 10 displays their 1978 to 1982 comparison of the FCE to sales ratio by product and segment size.

**EXHIBIT 10**  
**FACILITIES CAPITAL EMPLOYED/SALES**  
**BY PRODUCT AND SEGMENT SIZE**

	FCE & Sales Ratio		Average Annual Growth
	1978	1982	Rate: 1978 - 1982
Large (850 million in 1978)	13.5	16.0	4.3
Small (Remainder)	9.1	10.9	4.6
Aircraft	6.8	11.1	13.0
Shipbuilding	17.6	13.0	-7.4
Vehicles	6.0	11.2	16.8
Ordinance	9.9	16.1	12.9
Missiles	10.6	13.2	5.6
Electronic	13.7	14.2	.8
Technical Service	12.9	13.7	1.6

Source: LMI

LMI concluded that there was clear evidence of a high rate of investment between 1978 and 1982 by business segments doing the majority of their work for the government. They further concluded that the behavior of the defense industry, as displayed in their data, was consistent with the intent of the

policy changes made in 1976 and 1980 to encourage new investment. But, they also noted that because durable goods manufacturers also increased their capital intensity during the same period, it was not possible to definitively relate defense sector capital investments to the profit policy changes alone.

Another aspect of the capital expenditures made by the defense sector is the type of asset purchased. Exhibit 11 shows a breakout of capital expenditure in the DFAIR data set including ships and services by equipment, buildings and land. There is clear evidence that there has been a shift toward investment in buildings in comparison to equipment, though there was substantial growth in both.

**EXHIBIT 11**  
**DFAIR DATA**  
**CAPITAL EXPENDITURE BY CATEGORY**  
**(CURRENT DOLLARS)**

	<u>Equipment</u>	<u>Building</u>	<u>Land</u>
1975	518.8	115.5	47.9
1976	546.2	118.0	32.4
1977	666.8	140.4	24.4
1978	885.0	229.6	57.3
1979	1176.1	402.8	30.3
1980	1634.3	539.3	51.0
1981	1788.8	763.2	120.8
1982	2089.2	964.2	125.4
1983	2419.6	875.1	102.3
	1975 - 83 Growth Rate		
	21.23	28.81	
	1978 - 83 Growth Rate		
	22.28	30.68	

Source: Touche Ross

Equipment declined as a percent of the total from 76 percent in 1975 to 71.2 percent in 1983 while buildings increased from 16.9 percent to 25.8 percent. Land also declined significantly as a percent of the total in 1983. Because of inflation rate differences between these categories of assets, it is also necessary to investigate these values on a deflated basis. The values were deflated by the appropriate investment deflators to determine if infla-

tion was the source of this mix change. These inflation adjustment values are shown in Exhibit 12.

**EXHIBIT 12**  
**DFAIR DATA**  
**CAPITAL EXPENDITURE BY CATEGORY**  
**(ADJUSTED FOR INFLATION)**

	<u>Equipment</u>	<u>Building</u>	<u>Land</u>
1975	411.1	79.8	33.1
1976	407.9	79.2	21.7
1977	472.9	88.1	15.3
1978	591.2	130.2	32.5
1979	740.6	201.2	15.1
1980	966.5	237.1	22.4
1981	997.1	300.2	47.5
1982	1142.9	361.9	47.1
1983	1320.0	331.8	38.8

Once the values are adjusted for inflation, the conclusions change somewhat. In 1979, equipment makes up a total of 78.4% of the expenditures, and in 1983 it has only changed to 78.1% of the total. Buildings do increase as a percentage from 19.2% to 19.6%, but at the expense of land and not equipment. An investigation of the inflation rates experienced between structures and equipment reveals that prices for structures rose at a substantially higher rate.

LMI also reported on this area based on partial access they had obtained to a one-time survey conducted by the General Accounting Office. GAO made available to them aggregate index data which showed the percentage distribution of annual capital expenditures by type of asset. This data which was on a constant dollar basis indicated that over a five year period, an increasing percentage of capital expenditures went to buildings at the expense of equipment.

The reason that this is an important area to consider is the fact that contractors can substitute these assets between defense and nondefense work. If the facilities capital employed incentive factor is neutral between asset categories, it will theoretically benefit the contractor to purchase more of the more substitutable factor as it can be easily switched to nondefense use. While it is not true in every case, as a general proposition both land and buildings are more substitutable than equipment. While the data is somewhat inconclusive because of the effects of inflation, there appears to be some evidence that defense contractors have in part followed this expected pattern. While this result should not be unexpected, it does point out a flaw in the current profit incentive mechanism. It is in DoD's interest to encourage investment in defense unique items because no other economic incentive exists for the contractor. When the degree of substitutability is high, no specific profit incentive seems necessary.

### Multiple Regression Analysis Results On Aggregate DFAIR Data

As discussed in the investment theory portion of this chapter, three basic models were used to frame the regression analysis of the aggregate DFAIR data. Specifically, accelerator, liquidity, and neoclassical type models were used to identify the most significant relationships and variables, and to test for structural shifts caused by policy changes. The results are briefly summarized by model type, including the form of the best performing model under each theory.

Both the accelerator and neoclassical type models revealed significant relationships and essentially performed equally. The variable for the cost of capital in the neoclassical model was statistically significant at the 95% level as was the variable included to capture replacement investment. In the case of the accelerator type model, the change in sales variable was significant at the 95% level as again was the variable for replacement investment. Because this is a pooled data set with both time series and cross-sectional characteristics, binary variables were also included to capture cross product code differentials. As a group, these fixed effect variables were generally significant at the 95% level reflecting somewhat different investment patterns by product code over the sample period. The forms of the best performing neoclassical and accelerator models are as follows (all models were on a real basis to remove the effects of inflation - capital stock values were adjusted by a replacement value index obtained from the Bureau of Economic Analysis).

- o Accelerator - Real capital expenditures were regressed on the change in sales, change in sales lagged one period, the prior period capital stock level, and fixed effect variables for the different product codes. The  $R^2$  was 86.7 and both the change in sales and capital stock variables were significant. The model was significant at the 99% level.
- o Neoclassical - Real capital expenditures were regressed on the desired level of capital stock, which is sales divided by the tax adjusted gross of economic depreciation cost of capital, and the prior period

level of capital stock. Cross product code variables were also included. The cost of capital values used were aggregate ones published in the National Tax Journal.(33) The  $R^2$  was 90.19 and both the desired capital stock and prior period capital stock variables were significant. The model was significant at the 99% level.

The liquidity type models did not perform as well in the sense that only one of the liquidity variables proved significant at the 95% level. The liquidity measure that was significant was profits plus depreciation plus progress payments. It was significant at the 95% level. The problem with this result is that progress payments were the variable that made the difference, and since they are both an asset and a liability, the meaning of this result is unclear. The prior period capital stock variable was also significant in this model as were the cross product code variables as a group. The  $R^2$  was 84 percent and the model was significant at the 99% level. It should also be noted that profits were found to be a significant variable in some ad hoc models not based on a particular economic theory. For example, profits were significant when they were regressed along with a user cost of capital variable. Current profits consistently performed better than lagged profits reflecting the value of current profits as a measure of expected profits.

Structural change tests were also conducted on these models for the years 1978 and 1979, the years the profit policy changes should have become evident. Evidence of a structural change was found in those years at the 95% level. The problem with interpreting this result is that 1978 was also when DoD procurement outlays started to increase at a substantial pace, and that change could also have caused the structural shift. Since the change in sales variable was significant, and profits alone were not, it is not possible to determine statistically that the profit policies caused a change in investment behavior, at least as separable from other factors.

The implication of the regression analysis performed on the aggregate DFAIR data is that investment behavior in the defense sector is significantly affected by changes in demand and the financing cost of capital expenditures. Liquidity as represented by just profits doesn't appear to be as significant, but some larger measure of liquidity including depreciation and progress payments does seem to matter. Profits should not be discounted as an imputed determinant, though, because in a time period of less rapidly increasing sales and less volatile capital costs, their influence would in all likelihood be greater.

### Conclusions

- o Capital expenditures for equipment, buildings, and land have increased in the defense sector over the last nine years at a substantial rate on both a real and nominal basis. There is also evidence that this increase has been greater than has occurred in the nondefense sector.
- o The defense sector has become more capitalized in the last nine years as evidenced by the increase in the FCE to sales ratio. It still does

not use as much facilities capital per dollar of sales as does the nondefense sector, but its rate of increase has been substantially higher than the nondefense sector, and much more consistent.

- o The mix of capital expenditures has changed over the sample period to some degree, with building expenditures increasing at the expense of equipment. The effects of inflation cloud this issue somewhat.
- o Statistically, the most significant variables affecting investment behavior in the defense sector are sales and the cost of capital financing, but a liquidity variable which includes profits cannot be ruled out.
- o There does not appear to be any statistical evidence that the defense sector does not respond to the same investment determinants as the rest of the economy. This implies that tax policies and cyclical demand fluctuations can also be expected to affect defense sector investment patterns, and should be considered in structuring DoD policies.

#### Recommendations

- o Continue the use of a facilities capital employed factor in the profit calculation as well as other investment incentive programs. These programs could become even more important during a time of less rapidly increasing sales.
- o Revise the facilities capital employed factor in the profit calculation to reward equipment at the current rate of 16-20%. Reduce the reward on buildings to 6-10%. Eliminate the reward for land.



## CHAPTER VII

### OTHER ISSUES

#### FOREIGN MILITARY SALES

On Dec 15, 1983, the Defense Policy Advisory Committee on Trade (DPACT) issued its first report, which contained a number of recommendations for changes to trade policies intended to increase benefits to government and industry alike. (34) One of the issues addressed in their report concerned Foreign Military Sales (FMS) profit policy and progress payment rates. Since DFAIR had been chartered to examine contract pricing, financing and profit policies, this issue was assigned to DFAIR for consideration in the overall study.

The DPACT report recommends that the DAR policy be revised to:

- o Recognize additional FMS risks through restoration of the additive 1-4% profit factor
- o Increase the standard FMS progress payment rate from 95% to 100%.

The report points out several factors associated with performing FMS contracts which create additional risks not found in doing business with DoD. They are:

- o Fulfillment of offset or industrial benefit agreements, which have become prevalent in FMS programs, and which require contractors to incur costs long after the particular contract work is completed.
- o Performance of work in a foreign country where the contractor is subjected to that country's peculiar laws, rules, regulations, customs, etc.
- o Substantial marketing expenses are often incurred over a considerable period of time in advance of any sale, the costs of which are currently unallowable unless identifiable to a particular FMS contract.
- o Special equipment configurations required by foreign governments which create added design, production and accountability problems not encountered with U.S. requirements.
- o Foreign customer delivery requirements which often require the ordering of materials and commencement of production prior to signing of letters of offer by the foreign customer, with no assurance of recovery of the investment.

- o Contractors' greater degree of cost responsibility because of the necessarily longer period of validity of proposals flowing through the prolonged FMS cycle, and the frequent necessity of committing to not-to-exceed prices before firm subcontract prices have been received.
- o Potential instability of some foreign governments which creates potential for greater contract costs and increased risks.

With respect to progress payments, the DPACT questions why FMS progress payments are limited to 95% in lieu of 100%, and offers four arguments to support the 100% rate.

- o On direct sales, U.S. concerns customarily receive large up-front payments from foreign customers and maintain a continuing positive cash flow.
- o Since progress payments are only made monthly and since all suppliers must actually be paid before their billings may be included in a contractor's invoice for progress payments, U.S. concerns experience a significant negative cash flow even at a payment rate of 100%.
- o Contractors receive no payment for profit until actual deliveries are made, which creates a negative cash flow over the entire, often lengthy, delivery schedule.
- o Since the U.S. government collects payments from foreign nations based on full progress payments, the DPACT believes this standard condition of trade (payment) should pass though to the company selling the goods, even though the transaction occurs under an FMS agreement.

In examining the issues raised by the DPACT, the Defense Security Assistance Agency (DSAA) noted that not all risks cited are in fact applicable to FMS. (35) For example:

- o The potential instability of certain countries does not increase risk under FMS, especially in view of the recent Federal Electric decision, and DoD's efforts to assure there is sufficient termination liability on deposit for all programs.
- o Special configuration efforts required by the FMS customer are normally fully reimbursable expenses to the contractor.

DSAA does agree that offset requirements imposed upon the contractor as a condition of the sale and the requirement for longer periods of commitment to not-to-exceed prices and delivery schedules may add additional risk to FMS contracts in excess of that experienced in dealing with DoD.

It should also be pointed out, that while FMS procedures are intended to provide the FMS customer essentially the same contract terms and conditions used by DoD for its own purchases, there are some notable exceptions to this general policy such as:

- o Progress payments for FMS contracts have been higher than they are for DoD contracts since September 1977 when DoD, in response to Presidential Directive 13, eliminated the 1-4% profit factor for additional FMS risk, and raised progress payments to partially offset the elimination of the extra risk factor.
- o Current cost allowability rules permit the recovery of over-ceiling IR&D/B&P costs on FMS contracts, which is not the case on DoD contracts.

In order to determine the financial impact of the above issues, DFAIR collected data separately for DoD & FMS business for the years 1981-1983. Given the above, one might expect to observe the following concerning FMS business in comparison to DoD business:

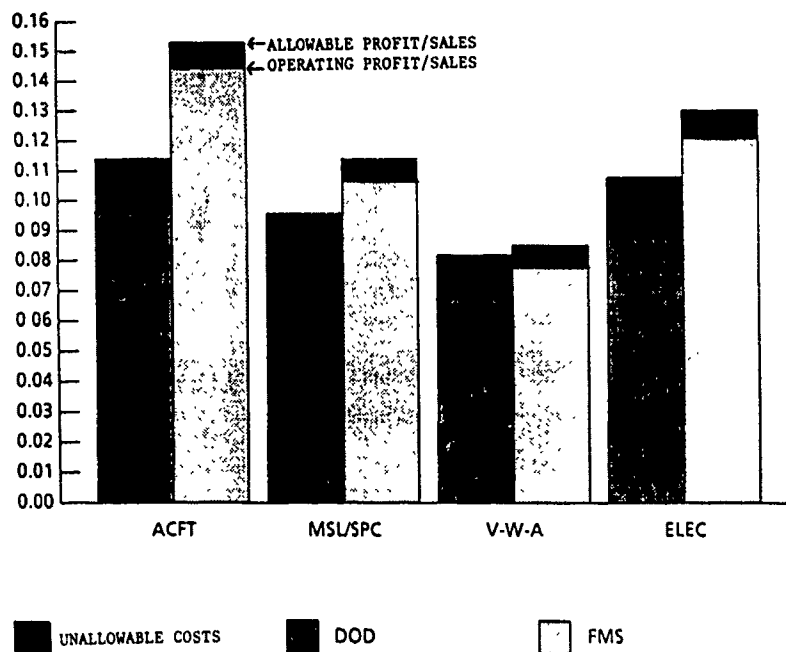
- o (Sales - allowable costs)/sales for FMS business should be approximately the same as DoD prime contract business. This ratio might be higher for FMS fixed price contracts if the proportion of firm-fixed-price contracts is higher than for DoD.
- o Unallowable costs/sales should probably be less for FMS, because over ceiling IR&D/B&P costs, which are the largest single unallowable on DoD work, are allowable on FMS contracts.
- o Operating profit (Sales - allowable costs - unallowable costs, except interest) divided by sales should be slightly higher on FMS business.

Exhibit 1 shows the comparison of FMS profits to sales by major product group for the period 1981-1983. Unallowable over-ceiling IR&D/B&P costs were allocated only to DoD contracts.

As can be seen:

- o (Sales - allowable costs)/sales is generally higher on FMS business than it is for DoD prime contracts of the same type. This is not what we would have expected, unless the FMS proportion of firm-fixed-price contracts is higher than for DoD.
- o Unallowable costs/sales are lower on FMS business. This is what we would have expected.
- o Operating profit/sales is higher on FMS than on DoD business, from .8 of a point on vehicles, weapons and ammunition to 4.9 points on aircraft. This is what we would have expected, although perhaps not to that magnitude.

**EXHIBIT 1**  
**ALLOWABLE PROFIT/SALES 1981 - 1983**  
**FIXED-PRICE CONTRACTS**



Source: Touche Ross

**Conclusions**

- o In spite of the DPACT's assertion of shortcomings in DoD profit policy, there is little evidence from the financial results to indicate the profit policy is preventing adequate FMS profits in comparison to profits on DoD prime contracts.
- o The higher level of financing provided on FMS fixed-price contracts has contributed to an even greater difference in economic profits. If progress payments were raised, that condition would be widened even further. If they were lowered the condition would be narrowed.
- o Some of the DPACT arguments about extra risk in the FMS environment have merit, especially the offset requirements and the longer period of commitment to price quotes. Others however are not as compelling and are covered by the increased allowability of costs on FMS contracts.
- o DoD's policy of requiring sufficient foreign customer deposits to cover full costs of the FMS contract is intended to minimize both U.S.

Government and contractor risk in conducting FMS business. The mere fact that moneys are collected in advance is not a compelling argument for increasing contractor progress payments.

- o If extra risk factors for FMS business are reinserted in DoD markup policy, then the progress payment rates should also be established at the same levels as for DoD business, so that foreign customers can have greater assurance they are receiving essentially the same treatment afforded to DoD contracts.

### Recommendations

- o Provide an extra risk factor in the DoD markup policy in the 0-2% range to be selectively applied on FMS sales that entail burdensome offset requirements and/or abnormally long periods of commitment to not-to-exceed prices and delivery schedules.
- o Return progress payment rates on FMS contracts to the same level available on DoD prime contracts.

### SUBCONTRACTS

At the outset of the DFAIR study it was believed that a comprehensive analysis of the subcontractor base could be performed. The following factors prevented a comprehensive analysis:

- o Identification of the subcontractor universe. While there are literally thousands of firms who perform as subcontractors on DoD work, DoD does not have a central data base which identifies the firms, their line of business, or the degree of involvement in DoD versus non-DoD work. Some initial attempts were made to identify up to 50 firms who performed strictly at the subcontract level, but there was very little assurance they would be at all representative of the universe.
- o Degree of information to be gathered. Considerable effort was devoted to developing and refining a financial data collection package to obtain the minimum essential information from large DoD prime contractors. However, even this minimum essential information, scaled to subcontractors' circumstances, would have imposed considerably more data collection burden on subcontractors relative to that imposed on major prime contractors. Since data collection and submission were voluntary, the participation rate probably would have been low.
- o Time and resources. The primary task of evaluating the financial results of DoD policies on major prime contractors, within the time and resources available, proved to be more difficult than originally expected. It was therefore decided to drop the subcontractor effort.

DFAIR, however, did collect subcontract financial data from the 76 participants for the years 1981-1983 so that comparisons could be made between the results achieved in the role of subcontractor and the role of prime contractor on negotiated contracts. In addition, DFAIR reviewed other studies which addressed the subcontractor issue. The following discussion will cover the observations and conclusions of two of the other studies.

#### "Blueprint for Tomorrow"

In the past few years concerns have been raised over the declining subcontractor base and the implications for industry's ability to meet efficient peacetime production requirements let alone surge and mobilization needs. The FY 1984 Air Force Production Base Analysis entitled "Blueprint for Tomorrow" noted the following about conditions faced by subcontractors which are different from those faced by prime contractors. (36)

- o The trend towards vertical integration on the part of primes is of increasing concern. Often a prime is both a customer and a competitor on different programs.
- o There is a reluctance on the part of prime contractors to flow down favorable clauses included in the prime contract ... Typically under the DAR, only the restrictive DAR provisions are mandatorily flowed down to subcontractors. Those DAR provisions affording benefit to a contractor are rarely flowed down from the prime to the sub (e.g., MANTECH, Capital Facility Investment).
- o Budget pressures on the prime are reflected in subcontractor negotiations for follow-on prices and occasionally result in strained relations. Cost reduction suggestions that affect the product design appear to be impossible to get approved.
- o Because of size, prime contractors have an inherent leverage over subcontractors and too often abuse that leverage through overreaching ... (an) example is a tendency on the part of prime contractors to leverage one government program against the other in dealing with subcontractors.
- o Prime contractors are afforded legal rights and remedies not afforded subcontractors ... subs do not have the administrative remedies against the primes which the primes have against the government.
- o Frequently a prime will apply more stringent specification-interpretations on a supplier than on its own internal operations when the part is made both in-house and subcontracted.

The major conclusions of the Blueprint study with regard to the subcontractor base were:

- o Subcontractor base capabilities are inadequate for timely delivery of key products,
- o Subcontractors feel they are not receiving the same opportunities afforded primes, and
- o The U.S. machine tool industry is declining.

The Blueprint study's recommendation was to "provide increased productivity improvement opportunities to the subcontractor base. Two key elements of this strategy are: 1) a separate, distinct pool of enabling technology funds for TECHMOD/IMIP/MANTECH for the subtiers, and 2) continued effort to streamline the process of validating benefits to the government and paying incentives to the subcontractors who participate in TECHMOD/IMIP."

#### Naval Postgraduate School Thesis

A recent master's thesis by Keith S. Holtsclaw reported the results of information gathered from subcontractors identified by four prime contractors involved in shipbuilding and aircraft production. (37) The objective of his study was to examine the methods by which prime contractors motivate subcontractors to make productivity-enhancing capital investments. Data was collected via a survey instrument from 67 of 258 subcontractor firms who were requested to participate, as well as from interviews with personnel from four prime contractors and various DoD officials. The major findings of the study are:

- o Identification of "true" defense subcontractors is extremely difficult.
- o Prime contractors are not interested in incentivizing subcontractors to make productivity-enhancing capital investments.
- o Perceptions by prime contractor interviews and DoD interviews were inconclusive relative to the erosion of the subcontractor base.
- o The flow down and impact of profit policy and current capital investment incentivization programs has been negligible.
- o Stability of workload would provide the most incentive for capital investment at the subcontractor level.
- o Depending on the product, defense business is as profitable as commercial business at the subcontract level.

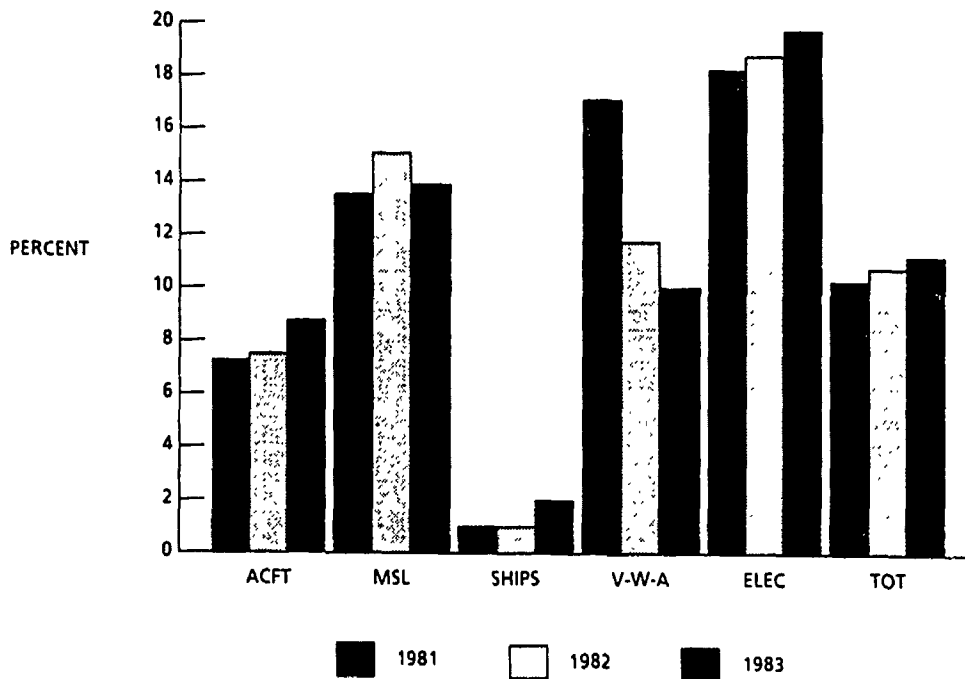
The recommendations of the study are:

- o DoD should define what it considers the subcontractor base and the surge/mobilization capacity actually desired.
- o DoD should become involved in determining ways in which the defined subcontractors can be incentivized to make productivity-enhancing capital investments.
- o DoD should be concerned with incentivizing capital investment at the subcontractor level ... (since a substantial) percent of the dollar value of contracts goes to subcontractors and represents a sizable sum considering the current DoD procurement budget.

#### DFAIR Contractor Data Analysis

While the 76 firms who provided data to DFAIR were selected to participate because they were major prime contractors to DoD, some of these firms also performed negotiated subcontracts for DoD programs. However, the amount of DoD business as subcontractors is substantially lower than that as prime contractors. Exhibit 2 shows the degree of negotiated DoD business within product groups performed as a prime and subcontractor for the years 1981-1983.

**EXHIBIT 2**  
**DOD SUBCONTRACT SALES**  
**(% OF TOTAL NEGOTIATED DOD SALES)**



Source: Touche Ross



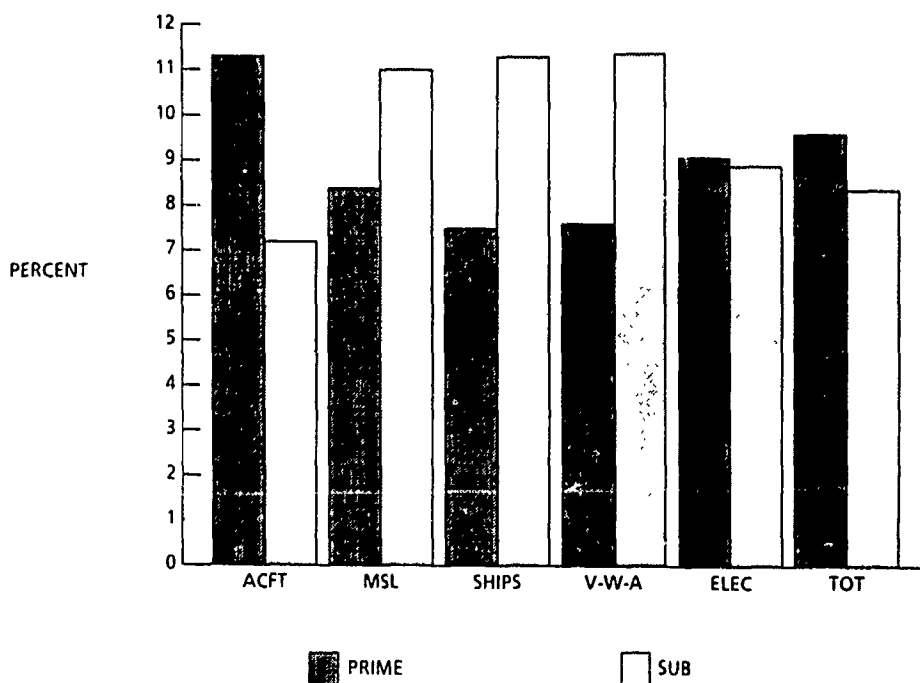
DoD negotiated subcontract business, as a percent of total DoD negotiated business, varies substantially between product groups and is probably not representative of financial results achieved or expected by concerns who are primarily subcontractors. It might be expected that returns on subcontracts for the DFAIR contractors would be lower than returns on prime contracts for the following reasons:

- o Technical and business risk on subcontracts is probably smaller than on prime contracts because they involve fewer items, less integration effort, represent smaller chunks of business, and are performed over shorter periods of time.
- o Subcontract business may be pursued by these contractors more as a means to balance the use of capacity and therefore be negotiated on a less than full cost basis.

The profits on DoD negotiated subcontracts in comparison to DoD prime contracts are shown on Exhibit 3.

### EXHIBIT 3

#### ALLOWABLE PROFIT/SALES 1981 - 1983 SUBCONTRACTS VS. PRIME CONTRACTS



Source: Touche Ross

The DFAIR data shows mixed results of relative profitability between DoD prime and subcontract business. The expectation of lower subcontract profits is not borne out for those product groups which have substantially more subcontract business.

The DFAIR has no conclusions or recommendations on subcontracting over and above those made by the two cited studies.

## CHAPTER VIII

### SHIPBUILDING

#### Unique Characteristics of Ship Acquisition

U.S. shipbuilding has long been almost wholly dependent on Government subsidies and naval orders for its existence. U.S. yards are not competitive with foreign yards, and survive because national policy decisions were made to maintain them for their potential importance in wartime. There is little apparent scope in shipbuilding for technical innovations of the kind that have made other defense industries internationally competitive. The industry is small measured on a national or international scale.

Although shipbuilding is relatively fragile as an industry, the nature of its product exposes it to great risk. Both commercial and naval shipbuilding are highly cyclical. Each naval ship takes years to build; the cost of a single ship can exceed the book value of the shipyard.

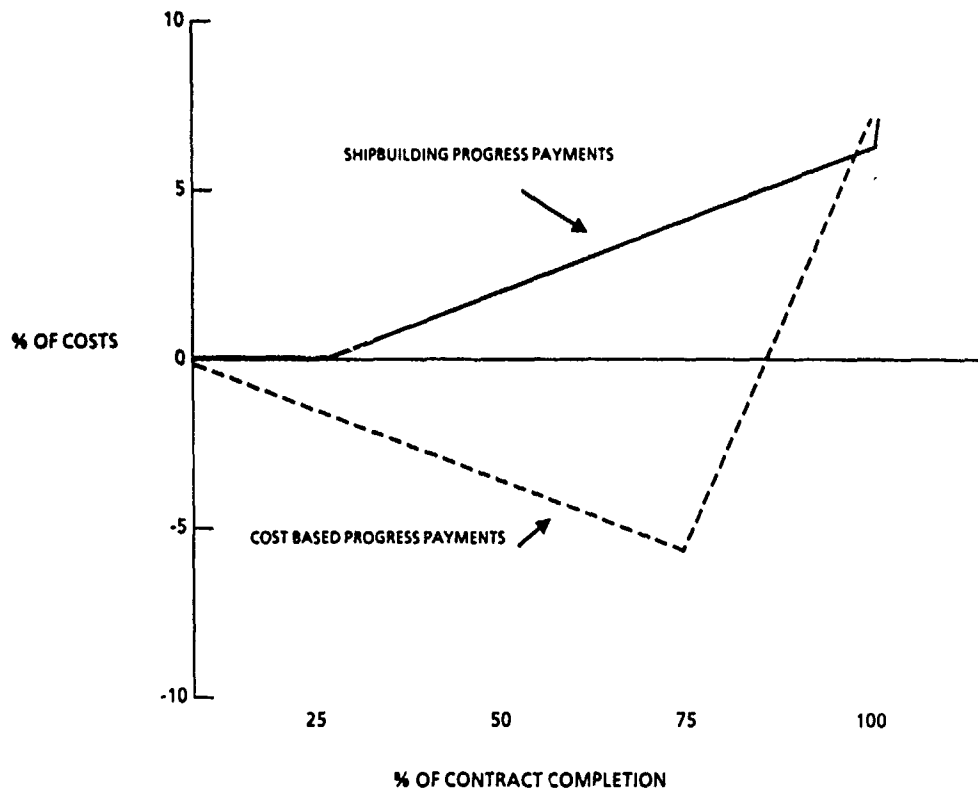
These considerations and others have given rise to financing and pricing practices which differ from those usual in defense contracting.

#### o Progress Payments

Shipbuilding progress payments are based on contract price and the physical progress of the ship's construction, which is closely monitored by Government inspectors. Payments are not allowed to exceed a percentage of the incurred cost; this percentage begins at 100% and increases as the ship passes the 25%, 50%, and 75% physical completion points. In general, so long as the ship is being completed near or below planned costs, shipbuilders can expect to receive progress payments in excess of their costs.

This method of payment is fundamentally different from usual DoD progress payments, which are based on cost, not physical progress, and which require significant contractor investment in inventory. Progress payments in FY 83 were 96% of shipbuilders' current assets, compared to 61% for the rest of DoD. Exhibit 1 graphically illustrates these differences in contract cash flow between cost based progress payments and shipbuilding progress payments.

**EXHIBIT 1**  
**CONTRACTOR CASH FLOW**



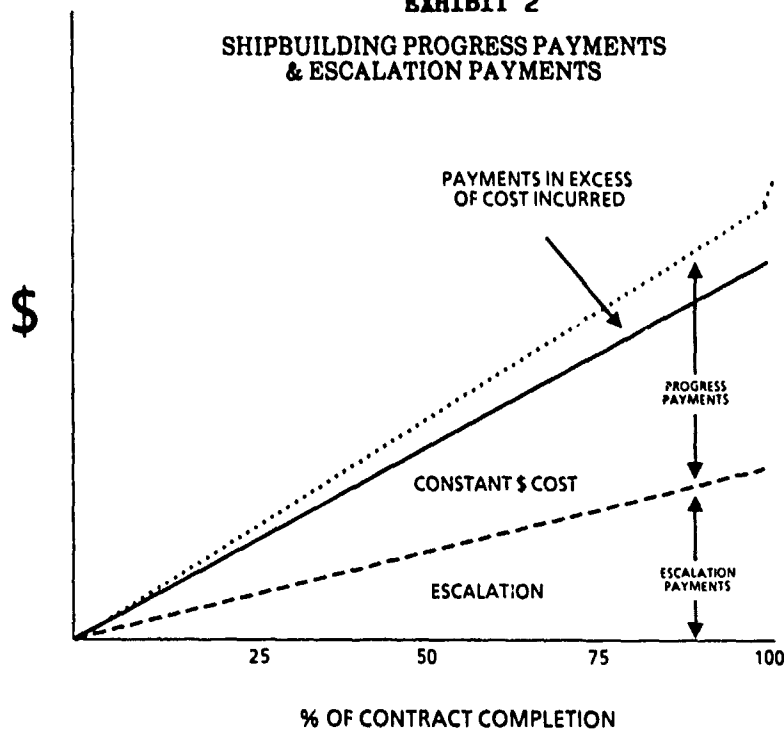
o Economic Price Adjustment (EPA)

An important contribution to shipbuilding cash flow is made by the special clause for EPA. This is superficially very different from usual EPA provisions, but is similar in ultimate effect. The clause operates to permit payment of actual costs, while using special price indices to determine the portion of actual cost to be counted against a constant-dollar target for incentive pricing purposes, and the portion to be reimbursed by a special escalation account. Escalation payments were reported in DFAIR's progress payments amounts, although they are contractually distinct from progress payments and are therefore not included in DoD's progress payment statistics. Exhibit 2 portrays the shipbuilding payment elements.

This treatment of escalation insures that progress payments (including escalation payments) are not affected by fluctuations in price levels, up to the post delivery date (generally 8 months after the ship's scheduled delivery date). It provides somewhat better protection than DoD's usual EPA clauses. Other DoD equipment, of course, is less subject to inflation risk because it is delivered sooner.

## EXHIBIT 2

### SHIPBUILDING PROGRESS PAYMENTS & ESCALATION PAYMENTS



#### o De-escalated Contract Costs

Generally, target cost on non-shipbuilding DoD incentive contracts is the amount negotiated as the cost of the equipment, including any costs due to expected wage and price level changes. If an EPA clause is included in the contract, it adjusts only for wage and price level changes different from these expectations. Ship contracts, on the other hand, express target costs in constant dollars, as of a date specified in the contract which is often several months before the contract award date. Proposals are submitted based on wage and price levels at that date, and costs are negotiated on the same basis. Escalation is estimated primarily for the purpose of negotiating an appropriate target profit. Escalated target profit is comparatively high as a percentage of constant dollar target cost. This practice has led to considerable confusion in reporting negotiated markups, since an expected markup of 10-15% on escalated costs has generally been reported as a markup of 20-30%, which is the usual ratio of escalated markup to de-escalated target cost.

#### Shipbuilding Markups

Data available to DFAIR for shipbuilding is so significantly different from other product groups that DFAIR believes it should be reported separately from financial and investment statistics for DoD as a whole. The DD Form 1499 data for shipbuilding, summarized in Exhibit 3 below, has a high degree of year-to-year variability.

**EXHIBIT 3**  
**MARKUP TRENDS, SHIPBUILDING ONLY, BASE FY 77**  
**OBJECTIVES AS A PERCENTAGE OF COST**

BASE	DIFFERENCES FROM BASE YEAR						
	<u>FY 77</u>	<u>FY 78</u>	<u>FY 79</u>	<u>FY 80</u>	<u>FY 81</u>	<u>FY 82</u>	<u>FY 83</u>
CITP Less 30% Offset	3.8%	0.6%	1.1%	0.6%	0.4%	0.1%	0.2%
Risk	5.1	(1.7)	(1.3)	(3.6)	(1.6)	(3.2)	(2.1)
Weight	-	0.1	1.0	0	(0.9)	(0.5)	(1.0)
Dist. Contract Types	-	(1.8)	(2.3)	(3.6)	(0.7)	(2.7)	(1.1)
FCE	1.0	0	0.1	(0.9)	0.5	(0.6)	0.8
Special factors	0.5	(0.3)	0	(0.4)	(0.4)	(0.4)	(1.1)
COM, Baseline 8%	1.1	(0.1)	0	(0.9)	0.5	(0.6)	0.8
Treasury Rate Changes	-	0	0.1	0.3	0.9	0.7	1.5
DAC 76-23 Offset Changes	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>0.6</u>	<u>2.1</u>	<u>1.0</u>	<u>2.2</u>
Total Differences	N/A	(1.5)%	0%	(4.3)%	2.4%	(3.0)%	2.3%
Total Markup Objective	11.5%	10.0	11.5	7.2	13.9	8.5	13.8%
Shipbuilding Cost as Percentage of Total DD 1499 Contracts	20.0%	14.8%	8.3%	8.0%	20.9%	10.7%	17.7%
Facilities Capital Employed as a Percent of Cost	14.2	12.0	12.9	4.7	19.8	8.1	22.0

Source: DD Form 1499 Data Base

The markup factors shown in Exhibit 3 are the same as those discussed in Chapter V. Their definitions are repeated here for easy reference.

- o CITP less 30% offset - CITP is the part of markup which is based on cost elements such as material, labor, and overhead. This markup is reduced by 30% to offset the addition of COM and FCE introduced by DPC 76-3.
- o Risk - "Risk" markup is derived by applying a weight, higher for fixed-price contracts, lower for cost contracts, to contract cost excluding COM. Both DPC 76-3 and DAC 76-23 made changes to this weight. Independently of these changes, aggregate markup for risk is highly sensitive to increases and decreases in the proportion of fixed-price to cost contracts, referred to as "Distribution of Contracts Types" in the exhibit.
- o FCE - "Facilities Capital Employed", the amount of facilities assigned to a contract, is multiplied by a percentage weight to arrive at FCE markup. This weight was changed by DAC 76-23. "FCE" is the amount of FCE markup attributable to the old weight. Markup due to the increased weight is one of the "DAC 76-23 Offset Changes."
- o COM Baseline 8% - This is cost of money assuming an 8% treasury rate. Cost of money due to increases and decreases from this amount is covered under "Treasury Rate Changes."
- o DAC 76-23 Offset Changes - This is the net effect on markup of the four DAC 76-23 changes to elements of the original DPC 76-3 offset. The changes are:
  - (i) Increased weight applied to facilities capital employed (increases markup)
  - (ii) Elimination of the 30% CITP offset for R&D and Service contracts (increases markup)
  - (iii) Dollar-for-dollar reduction in markup for cost of money on R&D and service contracts (reduces markup)
  - (iv) Nonrecognition of facilities capital employed in R&D and service contracts markup (reduces markup).

FY77 is the first year for which detailed markup objectives for shipbuilding are available, so it is used as the base year to show markup changes. It is apparent that the year-to-year changes are large, particularly when compared to trends for all other types of equipment. In general, years of high markups in shipbuilding such as FY 77, FY 81, and FY 83 are characterized by high percentages of facilities capital employed, and in these years, shipbuilding has approximately twice the importance in the overall DD 1499 data base.

These swings reflect a mixture of non-comparable data. When large ship purchases are negotiated, these are recorded in full in the year negotiations occur, even though construction will take many years. One or two large purchases are enough to double the shipbuilding portion of the data base over years when no large ships are negotiated. In other years, the data is dominated by purchases of reactor parts under cost-type contracts. These parts are subcontracted, so little or no facilities capital is reported by the primes. Use of the data means that it could be misleading to analyze trends in facilities investment. It causes fluctuations which are not indicative of actual changes in investment levels. The data says little about shipbuilding markups because, as defined in the DD Form 350 and DD Form 1499 data bases, "ships" includes a wide variety of ship parts which do not have the special characteristics of ship construction. Unless refinements are introduced, the data base is probably more relevant without "ship" data.

#### **Reasonableness of WGL Markup Policy for Shipbuilding**

It should be noted that current and past DoD policy has required the use of the Weighted Guidelines for fixed-price ship contracts as well as for other long-term fixed-price contracts despite substantially different financing policies. Responsibility for shipbuilding finance policy was delegated by OSD to the Navy a number of years ago. DoD fixed-price contract markup policy has implicitly included an amount to cover contractor working capital costs. Since shipbuilders have relatively less working capital investment, application of the Weighted Guidelines could have resulted in inappropriately high markups, although there is little evidence in the data that this has occurred. Nonetheless, markup and financing policies for shipbuilding contracts are in need of better integration.

#### **Shipbuilding Compared to Other Defense Industries**

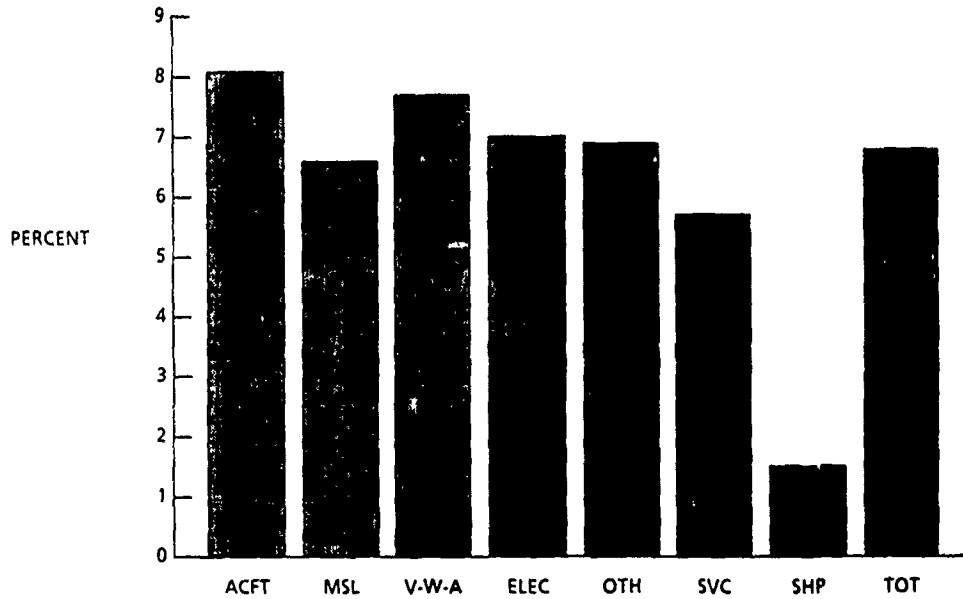
DFAIR collected financial and investment data from several large shipbuilders. This data tends to illustrate the unique characteristics of shipbuilding. Frequently, shipbuilding is the extreme case. In some years, and for some ratios, shipbuilding data is so different from the rest of the DoD product groups that its inclusion in the analysis conceals, changes or exaggerates major trends. These distortions are not caused (so far as DFAIR is aware, at least) by faulty definitions or data collection, but reflect the differences between shipbuilding and other defense industries. The following discussion will highlight the differences in comparison to other DoD product groups.

##### **o Profitability on Sales**

Exhibits 4 & 5 display operating profit as a percentage of sales. Exhibit 4 indicates that shipbuilding has been the least profitable of the DoD product groups for the years 1977 through 1983. Exhibit 5 shows that the low average is largely caused by the 1978 losses involved in claims settlements with the Navy. After 1978, shipbuilding operating profits to sales is in line with other product groups.

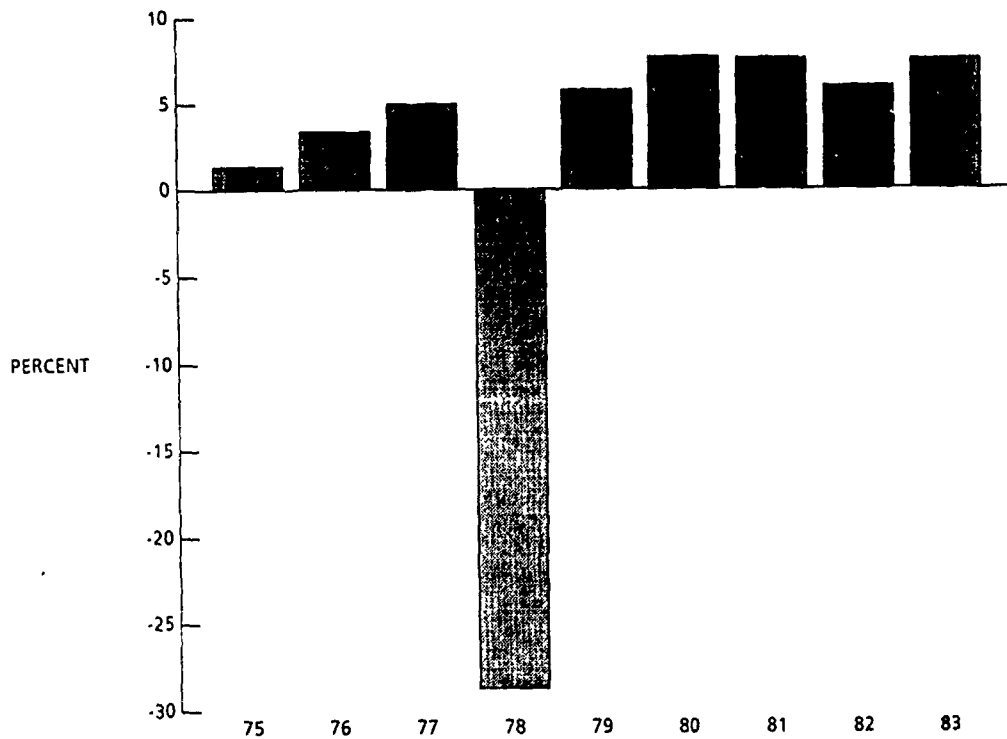


**EXHIBIT 4**  
**OPERATING PROFIT/SALES**  
**1977 - 1983 AVERAGE**



Source: Touche Ross

**EXHIBIT 5**  
**OPERATING PROFIT/SALES**  
**SHIPBUILDING**



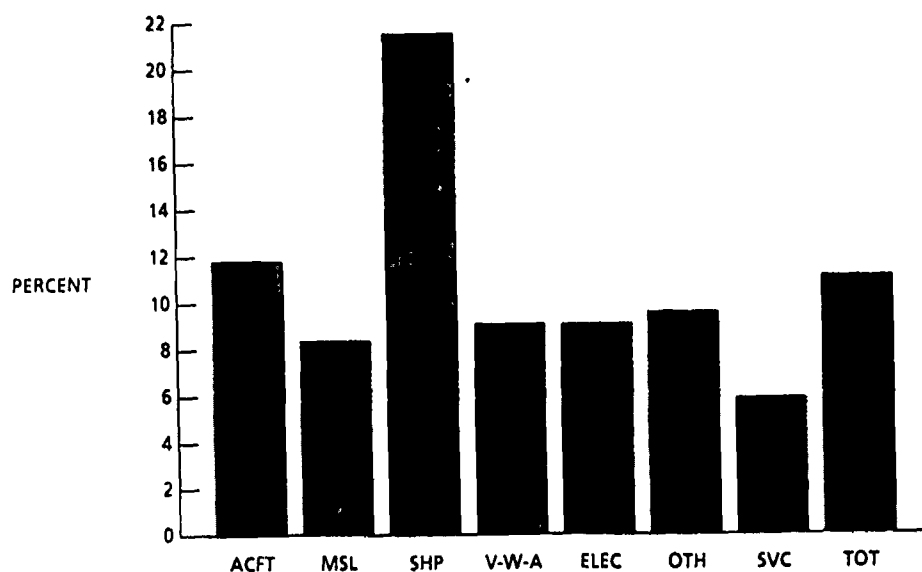
Source: Touche Ross

o Operating Profit + Imputed Interest/Sales + Imputed Interest

Exhibits 6 & 7 show the DFAIR adjusted operating profit/sales when imputed interest for government financing is included. By this measure, shipbuilding has the highest margins before interest and taxes of any defense industry, and is exceptional compared to commercial durable goods manufacturers as well. Of course, these "profits" would not flow to the bottom line, because they would be offset dollar-for-dollar by an imputed interest expense before they got there. Shipbuilding's standout position in this comparison is an effect of the long period required for ship construction, which necessitates large inventories as a percentage of sales. As discussed, these are now about 96% government-financed.

**EXHIBIT 6**

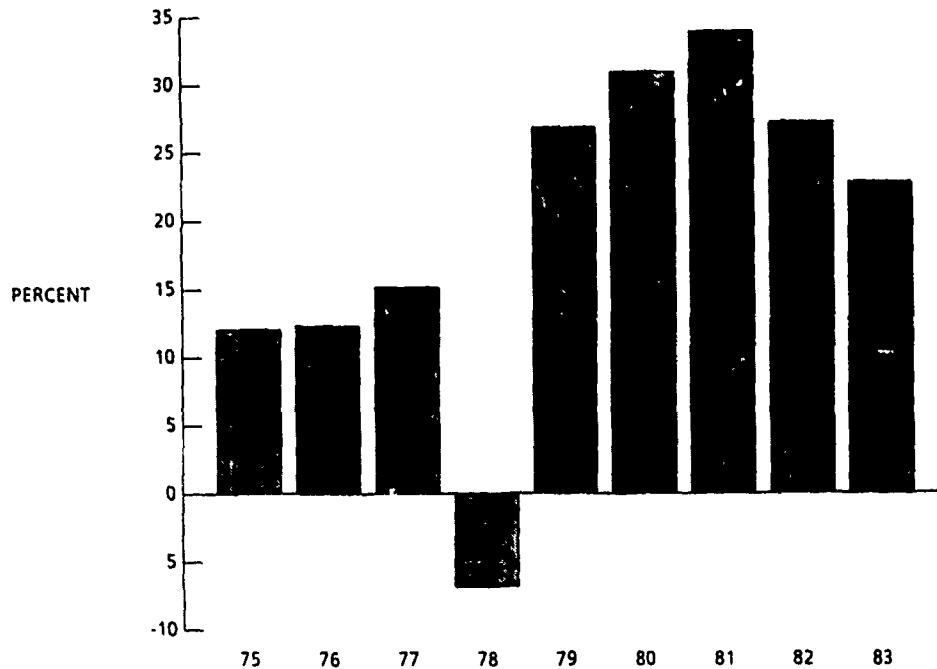
OPERATING PROFIT + IMPUTED INTEREST/  
SALES + IMPUTED INTEREST  
1977 - 1983 AVERAGE



Source: Touche Ross

## EXHIBIT 7

### OPERATING PROFIT + IMPUTED INTEREST/SALES + IMPUTED INTEREST SHIPBUILDING

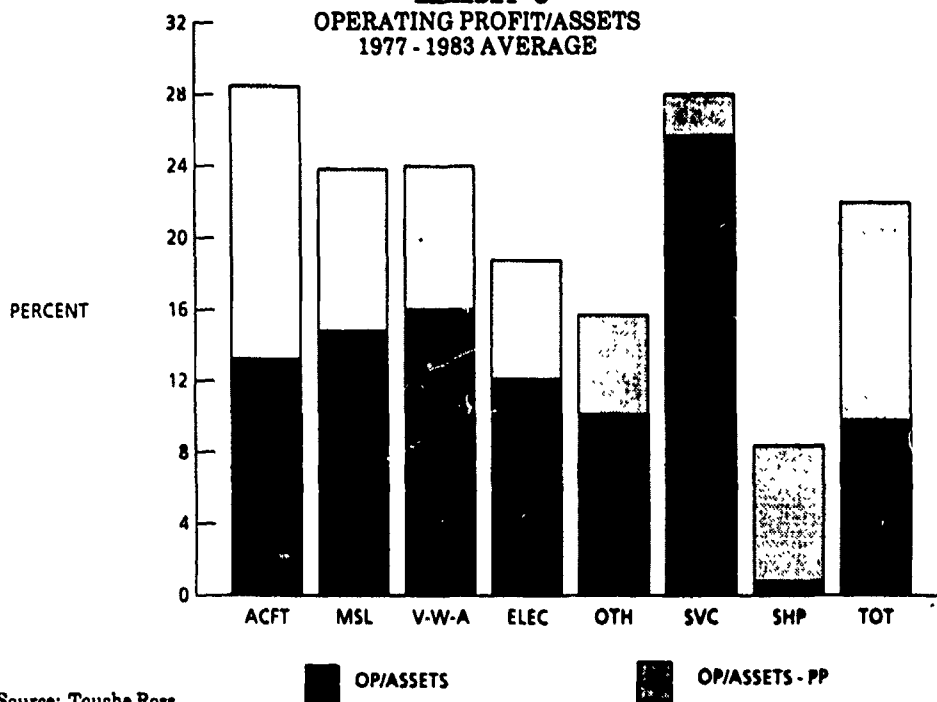


Source: Touche Ross

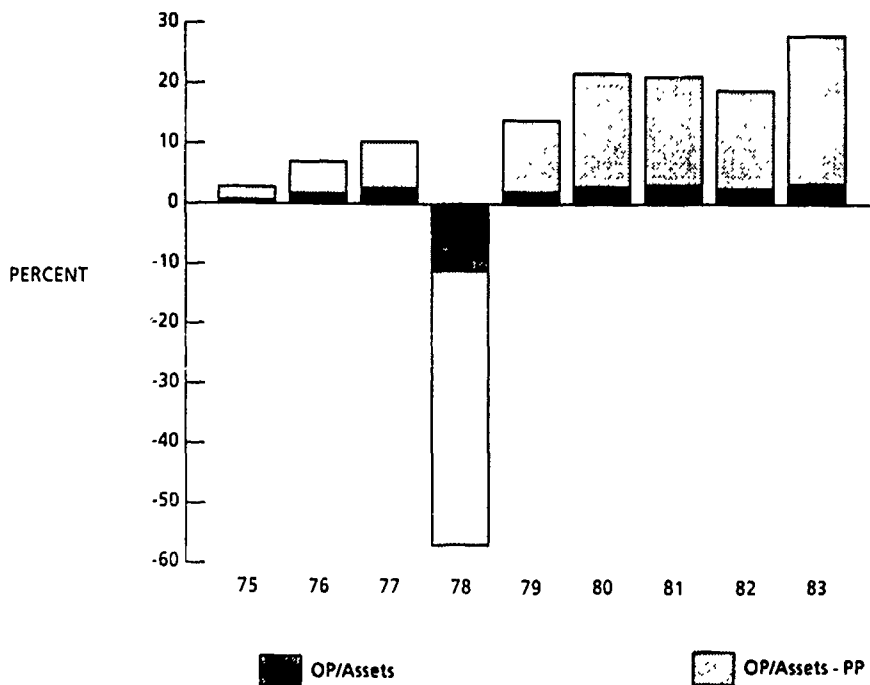
#### o Operating Profit/Assets

Exhibits 8 & 9 display return on assets. Exhibit 8 indicates shipbuilding achieved the lowest profit in comparison to other DoD product groups over 1977-1983. Again 1978 depresses the overall shipbuilding average because of the claims losses. Exhibit 9 shows shipbuilding operating profit/assets over the nine-year period. If progress payments are included in shipbuilding assets and no adjustment for the value of this financing is made, shipbuilding profits are negligible compared to the rest of DoD. Reducing the assets by progress payments gives a different picture. By this measure, shipbuilding is of comparable profitability after the FY 78 losses.

**EXHIBIT 8**  
**OPERATING PROFIT/ASSETS**  
**1977 - 1983 AVERAGE**



**EXHIBIT 9**  
**OPERATING PROFIT/ASSETS**  
**SHIPBUILDING**

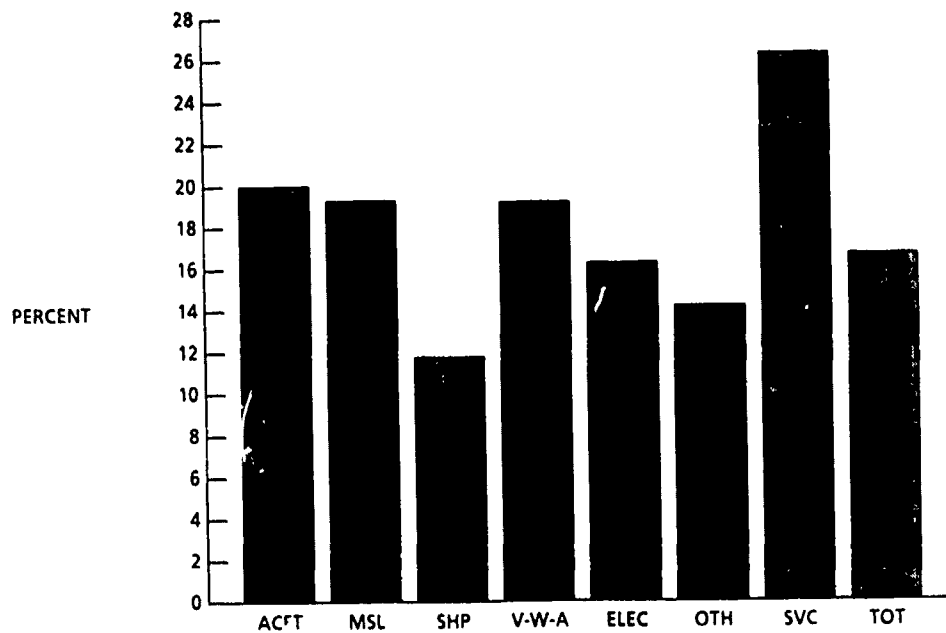


o Imputed Interest Adjusted Return on Assets

Exhibits 10 & 11 show the DFAIR-adjusted operating profit/assets when imputed interest for government financing is added. This adjustment shows shipbuilding profitability after 1978 to be somewhat below the DoD average.

**EXHIBIT 10**

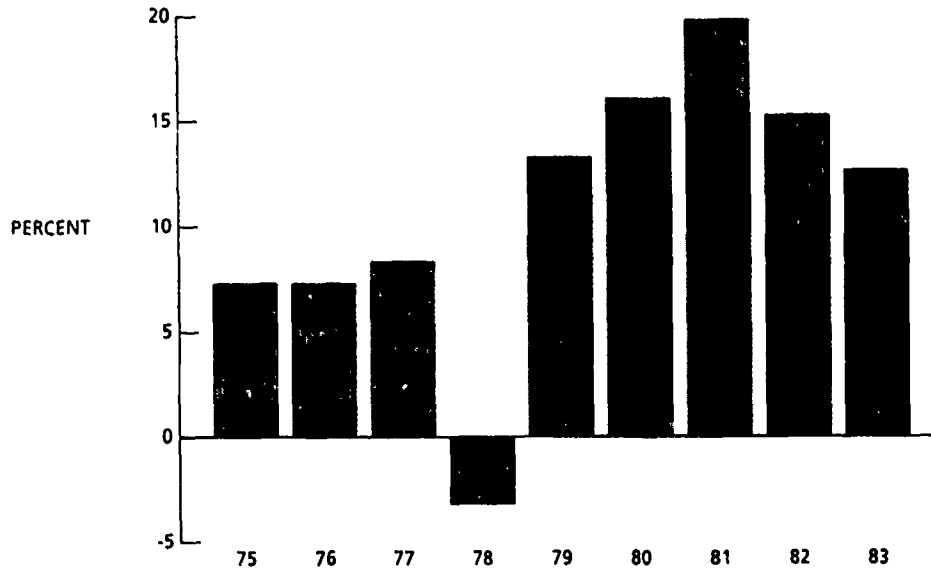
**OPERATING PROFIT + IMPUTED INTEREST/ASSETS  
1977 - 1983 AVERAGE**



Source: Touche Ross

### EXHIBIT 11

#### OPERATING PROFIT + IMPUTED INTEREST/ASSETS SHIPBUILDING



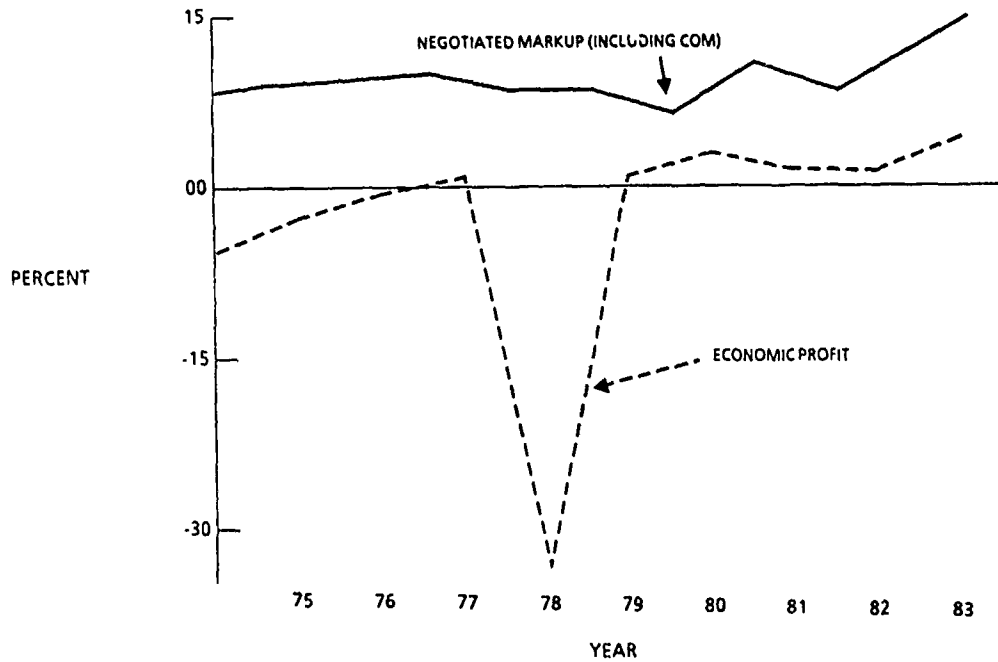
Source: Touche Ross

#### o Economic Profit

Exhibits 12 and 13 summarize the result of adjustments required by DoD's financing and markup policies to arrive at pre-tax "economic profit."

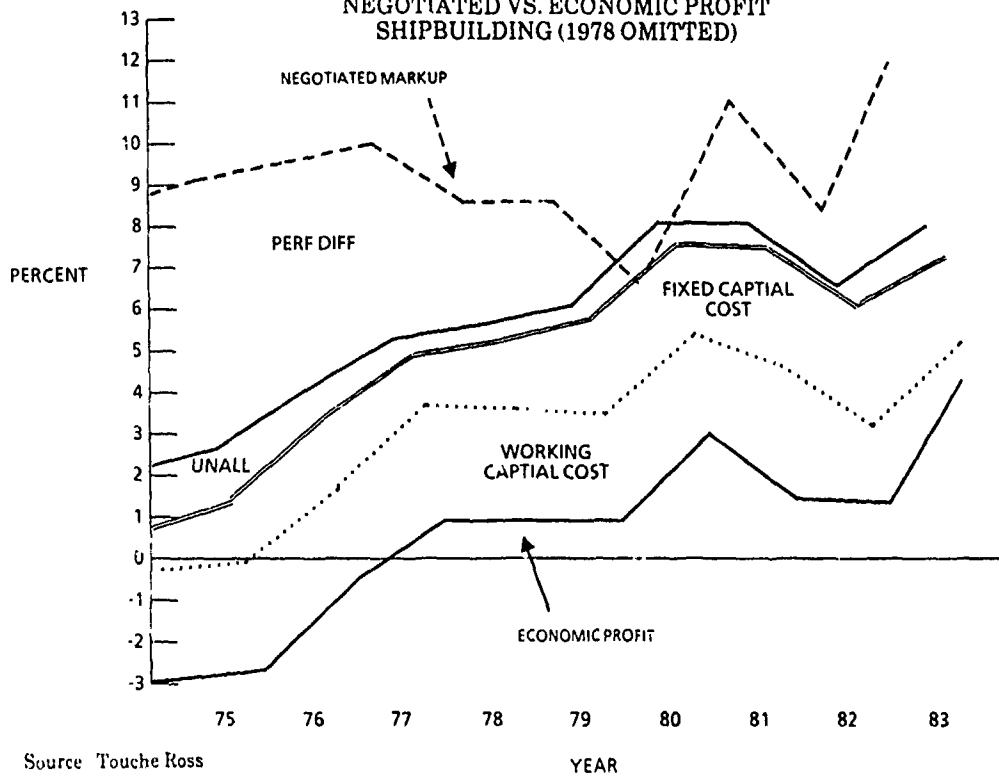
In Chapter V, Contract Markup, this analysis was used as a framework for integrating markup and financing policies, and as a basis for comparison with industries which do not have unallowable costs or receive much customer financing. Exhibit 13 presents the same data as Exhibit 12, except that 1978 has been omitted from the chart so that the scale can be made similar to previous economic profit charts.

**EXHIBIT 12**  
NEGOTIATED VS. ECONOMIC PROFIT  
SHIPBUILDING



Source: Touche Ross

**EXHIBIT 13**  
NEGOTIATED VS. ECONOMIC PROFIT  
SHIPBUILDING (1978 OMITTED)



Source: Touche Ross

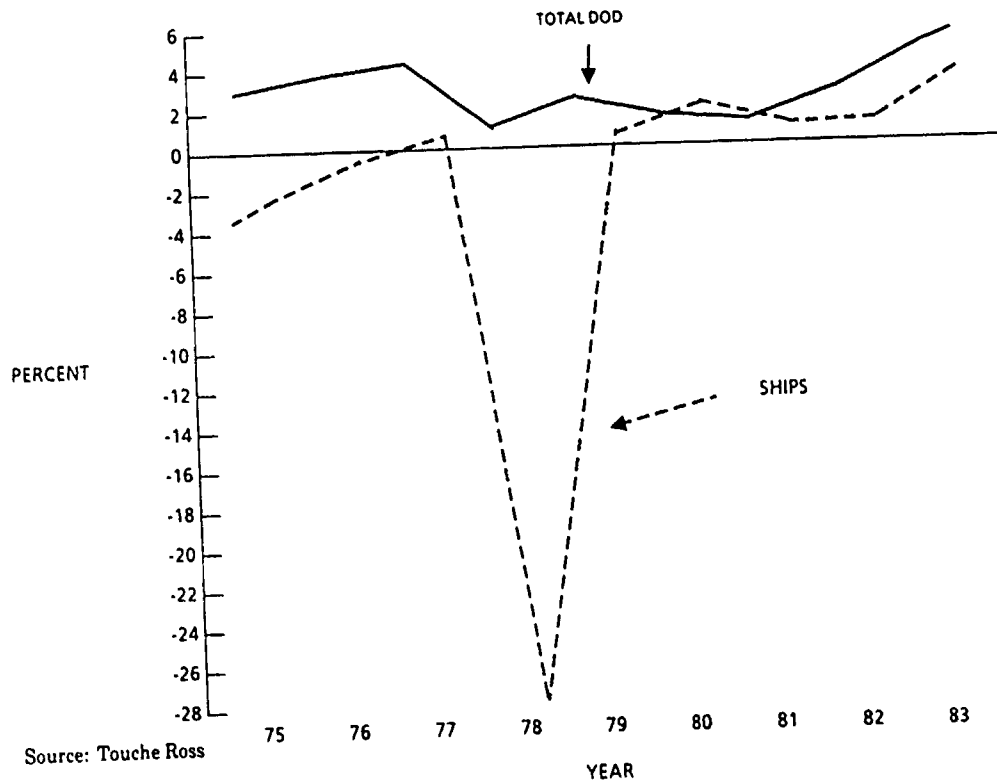
A comparison of Exhibits 12 and 13 with other economic profit exhibits presented in Chapter V shows the following basic differences:

- o The year-to-year change of content within the shipbuilding product code is evident by the high variability in the difference in negotiated markups and realized allowable profits.
- o Unallowable costs as a percent of sales are much less in shipbuilding than in other DoD product groups. This is primarily attributable to ships having very little overceiling IR&D/B&P expenses.
- o Imputed interest on fixed assets as a percent of sales is greater in shipbuilding than it is in other product groups, reflecting the greater facilities investment per sales dollar in shipbuilding.
- o Imputed interest on working capital as a percent of sales is less for shipbuilding than for the other product groups in the years since the settlement of the ship claims. This is because more shipbuilding current assets are financed by the Government. The cost of working capital would have been even lower except that shipbuilding current asset turnover is about one-fifth that of other product groups.
- o Economic profit/sales has varied widely for shipbuilders, but improvements since FY 78 are noticeable. Since FY 78, shipbuilders have earned less economic profit as a percent of sales, but have received more cost of money than total DoD business. The chart shows cost of money to be an important and relatively stable source of revenue, and discussions with industry executives confirm this.

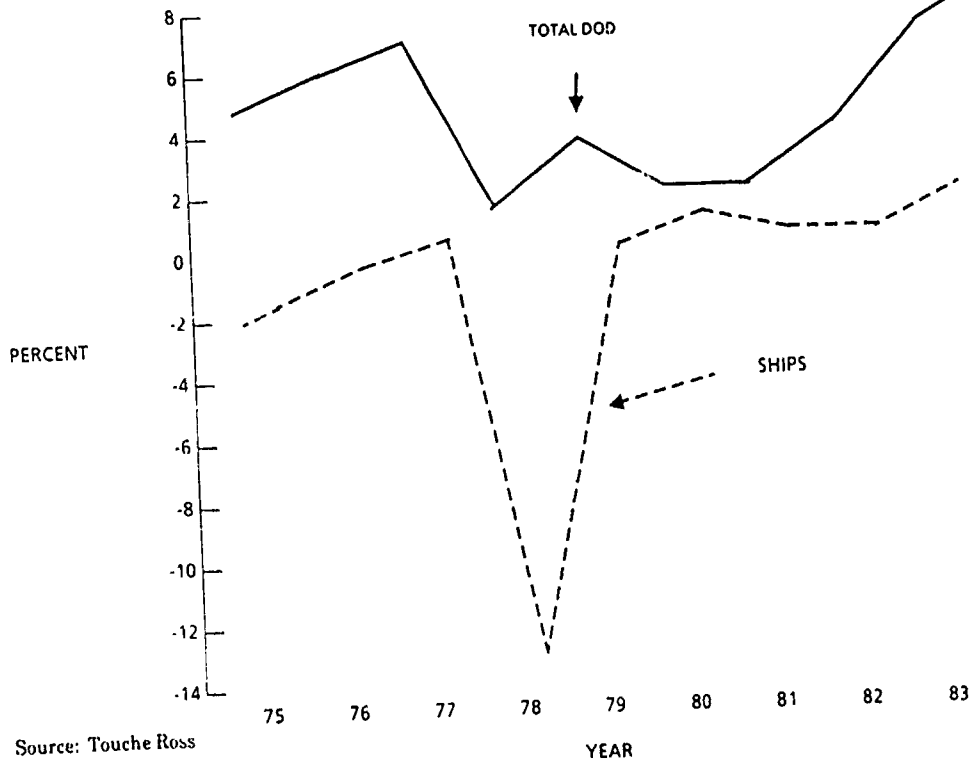
Exhibits 14 and 15 compare economic profit/sales and economic profit/assets for shipbuilding to total DoD business. To be consistent with the DFAIR methodology, this analysis also adds the imputed value of progress payments to operating profit and sales. As noted in Chapter V, these measures of profitability are the most meaningful of all those examined.



**EXHIBIT 14**  
**ECONOMIC PROFIT/SALES**



**EXHIBIT 15**  
**ECONOMIC PROFIT/ASSETS**

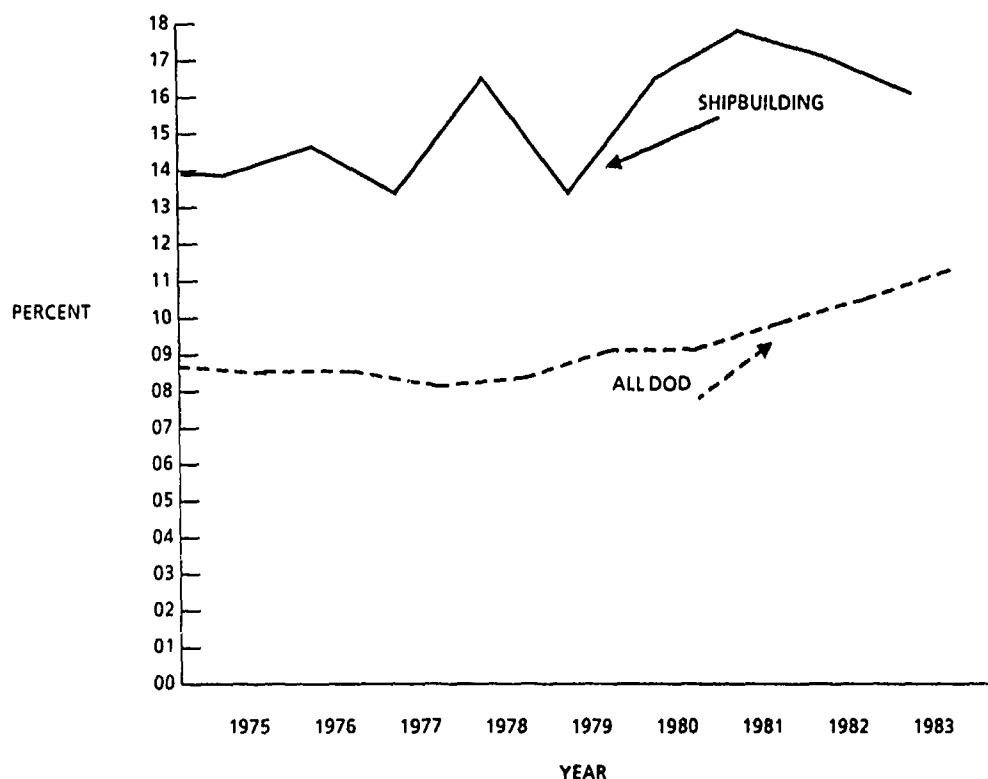


These exhibits demonstrate that profitability has improved since FY78 for shipbuilders, although not as much as for DoD business as a whole. The gap between shipbuilders and total DoD business is particularly wide when measured on a return-on-asset basis.

### Shipbuilding Investment

Exhibit 16 compares facilities capital (for this purpose defined as the net book value of land, buildings, and equipment excluding construction in progress) to sales for shipbuilding and for all DoD contractors.

**EXHIBIT 16**  
FACILITIES CAPITAL/SALES  
(CONSTRUCTION IN PROGRESS OMITTED)



Source: Touche Ross

High ratios of facilities capital to sales indicate a high degree of capital intensity. The basic differences between shipbuilding and the rest of DoD are that shipbuilding is more capital intensive, and its capital intensity is not increasing. The average life of assets is about twice as long in shipbuilding, so correcting for inflation would increase this differential. Since FY 79, both shipbuilders and DoD contractors as a whole have been using about half their operating profits plus depreciation for capital expenditures. Cash flow since FY 79 has thus been adequate to maintain shipbuilders' sales/facilities ratios.

Since capital expenditures tend to be in response to anticipated sales, this comparison may suggest that DoD contractors as a whole needed to expand capacity in response to the defense buildup beginning in FY 79-80, but that shipbuilders' capacity was more adequate. If this is so, the ratio for shipbuilding will tend to rise in the next few years as capacity is more fully utilized. Although the comparison does not suggest a rapidly expanding industry, this does not seem a cause for concern given the limited growth in demand once a 600-ship Navy is attained.

#### CONCLUSIONS

- o The DD Form 1499 data for shipbuilding is not a good yardstick against which to measure shipbuilding profit performance.
- o The Navy's use of constant dollar escalation provisions tends to create problems in reporting markups.
- o Inclusion of the reported shipbuilding results in the total DoD statistics distorts the DoD averages for 1975-1983 because of the large losses in the early years and the substantial differences in fixed asset and current asset characteristics of shipbuilding.
- o Since the settlement of the shipbuilding claims, shipbuilding profits have increased to the average of other DoD product groups as measured against both assets and sales.
- o DoD markup policy is even less integrated with financing policies on ships than it is for other product groups.
- o Cost of money under CAS 414 has been an important element in the recent recovery of profitability of the shipbuilding industry, and its inclusion has not caused excessive profits.
- o Capital investment in the shipbuilding industry as a percent of sales is not growing as in other DoD product groups.

#### RECOMMENDATIONS

- o Given the higher levels of financing provided on shipbuilding contracts, it is essential that markup policy be integrated with financing policy.
- o The Navy should examine the feasibility of employing cost based progress payments on ships used in conjunction with quarterly percentage of completion milestones.
- o The Navy should re-examine the use of constant dollar base economic price adjustment provisions. If these are retained, the Navy should insure that future reporting of negotiated markups is done on an escalated cost basis.

- o In view of its high levels of facilities investment and the importance of industrial base considerations, shipbuilding could benefit from a markup policy which discriminates in favor of facilities most desired by the Navy.
- o Given the less favorable investment trends in shipbuilding, the Navy may need to devote more attention to employing IMIP and other techniques to target needed improvements.

## CHAPTER IX

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### SUMMARY

The preceding chapters have described the DFAIR methodology and the analysis of the various policies being examined. Where possible, multiple independent sets of data were evaluated to determine if the results of the evaluation converged. As was hoped, this turned out to be the case, which leads us to the conclusion that a relatively high degree of confidence can be placed on the data which was analyzed.

Before summarizing the major conclusions and recommendations, it is useful to recapitulate the major environmental factors within which the defense industry operates.

- o Relative to most commercial items, defense items are technically complex, expensive and produced in low volume.
- o The rate of technological change is increasing exponentially which requires continual upgrade or development of weapon systems in order to maintain a competitive performance edge in the face of increasing technological threats.
- o Technological advance is also offering potential advances in the design and manufacturing of both defense and nondefense items. In some cases, design, manufacturing and testing of new technology items would not be possible without these design and manufacturing advances (i.e., microelectronic devices and new high-strength composite materials).
- o In order for U.S. industry to meet the defense needs of the nation, substantial resources must be devoted to research and development and capital investment, on a continuous and stable basis, if national defense forces are to be modernized and able to overcome potential adversaries.
- o Defense procurement regulations impose significant administrative burden and impose profit opportunity constraints not generally found in nonregulated commercial markets.
- o Given the rapid change in technology, the low volume of new items to be produced and the limited "rewards" available under defense regulations, U.S. industry is generally unwilling to underwrite the total investment of new weapon systems without substantial government participation.
- o Rapid change and low production volume make it highly desirable to acquire technologically flexible design and manufacturing capabilities

and to limit investment in fixed capital items unique to individual systems which will quickly become obsolete.

- o The acquisition of technologically advanced flexible design and manufacturing capabilities has the potential to increase quality and reduce the "touch labor" content.
- o This shift from traditional labor intensive design and manufacturing to technology intensive activities is highlighting the need and providing the ability to change accounting and management control systems in order to better understand and more efficiently use design and manufacturing resources.
- o In order for this essential change to take place in the defense industry, government must be willing to keep regulations adaptable to the changing conditions so they do not impede needed management change.
- o In order for this transition to take place at all, let alone in the most efficient manner and in the best interests of the taxpayer and industry alike, a cooperative environment is essential.

Most of the above conditions have been, to some degree, in existence in the defense environment since the end of World War II and the Korean conflict. Over the years, DoD contract pricing, financing, and markup (profit) policies have been aimed at achieving efficient weapon systems acquisition to minimize the cost to the taxpayer, and at the same time provide an equitable return to industry in order to insure their continuing interest in providing affordable items necessary for the nation's defense.

In general, the DFAIR analysis described in the preceding chapters has arrived at the conclusion that our current contract pricing, financing and markup policies are balanced, are protecting the interests of the taxpayer, and are enabling U.S. industry to achieve an equitable return for their involvement in defense business. Analysis of industry financial trends indicates that the goals of many of the previous policy changes in these areas are being realized, although there are also a number of refinements and improvements which need to be made.

## CONCLUSIONS

The following summarizes the major conclusions of the preceding analysis.

### Equity of DoD Financing Policies

1. In comparison to an analysis of contractor working capital costs resulting from DoD financing policies since 1954, the recent policy (90% for large business and 95% for small business) was equitable for the years covered by the study. The historical analysis of contractor working capital costs, performed on a "typical" contract, showed the

average cost of working capital financing to be about 2% of contract cost. During the years 1978 through 1980 the costs rose under the 80/85% policy to more than 4.0%. The analysis of economic profit in Chapter V corroborates the historical analysis as well as the representativeness of the "typical" contract. DFAIR concludes that the 2% average historical cost of working capital on the "typical" contract is a reasonable standard against which to judge the "appropriate" progress payment rate. Against this standard, the 1981 progress payment increase was justified. In today's interest rate environment, 90% progress payments would currently cost contractors 1.5% while 80% progress payments would cost 3.0%. At the 85% level, contractors' cost would be approximately 2.2%.

2. Current markup policy does not explicitly take into account the cost of working capital. This has been a long-standing deficiency of the various DoD Weighted Guidelines policies. While there have been past attempts to redress this (e.g., Defense Procurement Circular 107 in 1972), they have been overly complex and too difficult to implement. However, the cost of working capital will vary considerably, depending upon the length of contract and the pattern of deliveries, and there are relatively simple ways to calculate the approximate costs of working capital under these differing conditions.
3. Time to payment is a significant variable insofar as contractors' cost of working capital is concerned. It has long been DoD policy to pay progress payments as rapidly as possible (within 5 to 10 days). The failure to do so can add significantly to contractors' cost of working capital. Under the "typical" contract analysis, delaying payment until 30 days after receipt adds an additional 1% of contract cost. Delaying delivery payments from 15 to 30 days would not significantly add to contractors' costs since the amount being billed is net of progress payments previously paid.

#### Profitability of Defense Contracts

4. Profitability of defense contracts has not been unreasonable. Several comparisons were made with results of selected durable goods manufacturers over the period of 1970-1983. Before interest and before tax return on sales and return on assets ratios included an adjustment for the value of government-provided financing on defense contracts. This adjustment significantly increased the profitability of defense work. Additionally, an economic profit-to-sales measure was used to determine an after interest before tax return on sales. This measure of profitability imputes an interest expense as a surrogate for the opportunity cost of financing inventory or fixed assets. The value of government-provided financing is also considered by this measure.

Defense economic profits were very similar to those of comparable durable goods manufacturers for the years 1970 through 1979, and for the period of 1980 through 1983. The average defense profitability decreased slightly from the previous 10-year period while that of durable goods manufacturers deteriorated dramatically. There are a number of reasons for this result.

- o The durable goods profits during 1980 to 1983 are depressed due to the most severe recession in 50 years and are significantly below the average experienced during the 1970's.
- o Defense profits have not fallen as much as those of durable goods manufacturers during this period due to the increase in outlays associated with the defense buildup and the decline in inflation. The latter point undoubtedly had an impact on this result since contracts priced in 1979-1980 may have been based on an inflation forecast error which affects profit outcome to some unknown, but positive degree.

In comparison with commercial work in the same product groups during 1981-1983, defense profits were somewhat higher overall. However, this was due entirely to the aircraft and shipbuilding product groups, who were experiencing extremely low demand in commercial aviation and shipbuilding. Other product groups performed equally well or better on commercial work in comparison with defense.

5. FMS profits are greater than they are on DoD work while profits on DoD subcontracts are slightly less than on DoD prime contract work.
6. Realized profits have been consistently lower than negotiated markups. Where this comparison can be validly made (i.e., excluding ships), the gap between negotiated markups and realized allowable operating profit has varied between approximately one to three percentage points, and narrowed in the 1982-1983 years. The narrowing is probably attributable to efficiency improvements associated with increasing sales and a possible inflation forecast error in pricing.
7. CAS 414 "Cost of Money" has not caused a significant increase in profits. Cost of money rose substantially between 1979 and 1983, partly because of increases in the Treasury rate and partly because of increases in capital investment levels. However, increases in the Treasury rate merely reflect the same increases in borrowing rates being experienced by contractors for fixed asset financing, and increases in the level of capital investment represent the attainment of a DoD goal. There is no empirical evidence to support the allegation of the Survey and Investigative Staff of the House Armed Services Committee that CAS 414 and DoD markup policy constitute "Double Dipping".



8. DoD's Weighted Guidelines markup policy is being followed by contracting officers, but it is in need of improvement. The following are the major conclusions regarding the current Weighted Guidelines markup policy.

- o Variability between markup objectives was less than expected despite different contract conditions, indicating a need to tighten the ranges of markup factors.
- o DAC 76-23 added .5 to 1 percentage points in average markups above those expected.
- o The Productivity Factor introduced in DPC 76-3 has had very little application.
- o The policy needs to be simplified.
- o The policy needs to have an explicit integration with financing policy.
- o The current policy includes no consideration for contract length and is therefore indifferent to varying return on assets and risk.

#### Capital Investment and Efficiency Improvements

- 9. Significant capital investments have been made by defense contractors.
- 10. The rate of change in capital investment has been driven by factors other than DoD markup policy.
- 11. Current markup policy is indifferent to productivity of capital investments.
- 12. Markup policy, in and of itself, is insufficient to bring about productivity-enhancing improvements. Other methods are required.

#### Other Subjects

- 13. Shipbuilding contract pricing, financing and markup policies need re-examination.
- 14. FMS contract pricing, financing and markup policies need to be adjusted to approximate more closely DoD contract policy.
- 15. The nature and health of the subcontractor industrial base is not well understood.

## RECOMMENDATIONS

### Contract Financing Policy

1. Progress payment rates, timing and frequency should be established as follows: Given a requisite level of contractor-supplied financing at 2% of total costs on the "typical" contract and a Short Term Commercial Loan Rate of approximately 10%, the uniform standard progress payment rates should be revised as follows:

	<u>NOW</u>	<u>REVISE TO</u>
Large Business	80%	85%
Small Business	90%	90%
FMS (Large Business)	95%	85%
FMS (Small Business)	100%	90%
Flexible Progress Payment Investment Criteria	5%	15%
Maximum Flexible Progress Payment Rate	100%	100%
Frequency	Monthly	Monthly
Payment Time After Billing	5-10 days	5-10 days
Payment Time After Delivery Billing	15 days	30 days

2. Interest expense should remain unallowable and progress payment rates should be reset in the future based on changes in interest rates. If the Short Term Commercial Loan Rate should change enough to cause the level of contractor-supplied financing to be less than 1.5% or more than 2.5% of total costs on the "typical" contract, the uniform standard progress payment rate should be reset to the nearest five-point increment that approximates 2% of costs, and the flexible progress payment investment criteria should be adjusted accordingly.

### Markup (Profit) Policy

3. The overall policy should be simplified and better integrated with financing policy and length of contract performance. In addition, the following objectives should be achieved in the restructured markup policy:
  - o Increase emphasis on investment and decrease emphasis on cost in the markup policy and narrow the range of factors.
  - o Markup policy should yield results which are on average .5 to 1 point lower than results achieved under DAC 76-23.
  - o The current special factors should be rescinded, but a special factor for FMS risk should be established.

- o Markup on facilities capital employed should be based on productivity and risk of assets.
- o Provide an explicit, but simple, method to calculate a cost of working capital markup amount.

#### Other Pricing and Allowable Cost Issues

4. Milestone or interim acceptance payments should be permitted on large dollar contracts where there are more than three years from contract start to first delivery. If the above markup policy changes are made, a milestone or interim acceptance policy should be established to allow contractors to receive payment, including some portion of markup or fee, based on physical progress. This is necessary to prevent undue financing burden on the contractor and to avoid unduly high contract markup. Milestone/Interim acceptance should be:
  - o Scheduled to commence not earlier than six months after contract start.
  - o Based on clearly identifiable events whose completion can be verified and whose costs can be reasonably estimated.
  - o Should occur not more frequently than monthly and preferably on a quarterly basis.
5. Economic price adjustment clauses should be used on all large dollar contracts whose period of performance is three years or longer. This is especially necessary in periods of declining inflation to protect the Government's interest. It is desirable in all periods in order to remove inflation risk contingencies from the pricing baseline. In order that prices reflect expected inflation, constant dollar EPA clauses should not be used except in exceptional circumstances.
6. Cost of money should continue to be treated as an allowable cost. The CAS policy is achieving the goal of explicit identification of the opportunity costs of facilities capital. Industry and government people understand its treatment as an allowable cost and the cost-based portion of the markup policy has been reduced to offset its inclusion as an allowable cost.

#### Capital Investment and Productivity Improvements

7. Efforts to motivate contractors to acquire productivity enhancing capital and to make other productivity changes should be pursued on an extra contractual, plant-wide basis. The IMIP program is moving in the right direction and should continue to receive top management support. Concerns expressed by many regarding the complexity of implementation need to be addressed to help expedite the process.

### Shipbuilding

8. The Navy should re-examine its current shipbuilding pricing, financing, and markup policies with the objective of making them conform with the above recommendations.

In order to achieve the implementation of uniform policies, DFAIR believes shipbuilding contracts should be priced on the same basis as other DoD contracts, and with the adoption of these recommendations, believes there will no longer be a need for the unique shipbuilding contract pricing approach.

### Subcontractors

9. DoD should better define critical needs from the subcontracting base and provide productivity-enhancing incentives directly with critical subcontractors and/or assure that prime contractors are doing so.

### Feedback and Future Monitoring System

10. The negotiated markup reporting system (DD Form 1499) needs to be strengthened. DFAIR found the DD Form 1499 reports to be invaluable in conducting the study and believe they are vital as a management tool to observe trends for future policy making purposes. However, major reporting system weaknesses were encountered during the study and a great deal of effort had to be expended to insure the data base provided a reliable basis for comparison.
11. Actual Results Being Achieved Under DoD Contracts Also Need to be Reported. Studies of this type can only be successful if access to the actual contractor results are available. DFAIR and Profit '76 spent a considerable amount of time and effort in structuring a meaningful data collection instrument and had to rely on the voluntary participation of contractors. In addition, the data collection, verification, reporting and processing efforts and costs were substantial for the participating contractors, largely because of the requirement to gather nine years of data.

DFAIR believes the availability and quality of data would be improved and obtained with less effort if the period of time between studies was 3-5 years instead of 9-10 years as was the time difference between Profit '76 and DFAIR.

### MARKUP POLICY ALTERNATIVES

DFAIR has structured and analyzed the framework of two alternative revised markup policies based on the anticipated approval of the recommended financing policy. In addition, a third alternative was briefly examined to

assess its potential implications. The alternative revisions to the markup policy, which will achieve the objectives stated under recommendation number 3 are:

- o Alternative 1 - Cost Allowability Treatment Unchanged from Present Practices. Under this alternative the following changes would be made:
  - o Cost input to total performance - The number of cost factors are reduced from 11 to 3. The weight ranges are lowered overall by 40 percent in addition to being narrowed.
  - o Cost Risk - New instructions would:
    - Provide less markup for shorter contracts.
    - Remove the portion of the current risk factor equal to the imputed cost of working capital financing.

This will achieve the objectives of making markup sensitive to contract length and accommodate the inclusion of working capital markup.

- o Facilities Capital Risk - New instructions would:
  - Provide no markup on land.
  - Provide one-half the current markup on buildings.
  - Continue the current markup factors on equipment.

This will achieve the objective of differentiating markup based on the desirability/productivity of the fixed assets.

- o Working Capital Cost - New instructions would provide a simple approach to calculating the cost of working capital for fixed-price contracts based on:
  - Total allowable cost.
  - The progress payment rate.
  - Average time required.
  - The prime interest rate.

This will achieve the objective of direct integration of the financing and markup policies.

- o FMS Markup - A range of 0-2% of allowable cost would be provided to cover those situations where there is unusual risk associated with offset requirements or unusually long commitments to price quotes and delivery schedules.

- o Alternative 2 - Provide No Markup on General & Administrative (G&A) Expenses. This alternative would respond to the desires expressed by the Senate Bill 1029, SEC. 903. This alternative would be structured like Alternative 1, except:
  - o No cost markup would be made on G&A expenses.
  - o Contractor effort weight ranges would be lowered by 25% in addition to being narrowed.

Either of these alternatives can be easily implemented and will cause overall average markups as a percent of currently allowable costs to be approximately .7 of a point lower than the average in the 1981-1983 period under DAC 76-23. More detailed descriptions of these approaches along with some examples of their application are included later.

- o Alternative 3 - Make G&A Cost Unallowable. This alternative would take the same form as the first two alternatives except that G&A costs would be totally unallowable. There are a number of advantages to this approach but there are a number of disadvantages and dangers associated with it also.

The advantages would be:

- o Possible elimination of the need to review and negotiate large amounts of questionable costs - Both the Government and contractors would benefit.
- o The elimination of the need to negotiate annually IR&D/B&P ceilings, since all of these costs would be unallowable. Again both parties would benefit.
- o Permit reallocation and concentration of government resources towards evaluating "prime" costs of contracting - direct costs and directly associated overhead costs.
- o Move more towards a commercial markup pricing philosophy.

The disadvantages, at least for the present, are:

- o Markups on the remaining allowable costs would have to be, on average, more than double the current markups on currently allowed costs to attain the recommended markup objectives.
- o There currently is a wide variation in contractor accounting practices and the proportion of G&A expenses to total allowable costs. Moving to this alternative would cause harm to some and windfall rewards to others.
- o Cost migration from G&A to other allowable cost pools could take place and the potential windfalls would be compounded.

- o Current cost accounting standards and cost allowability rules are not ironclad enough to prevent the cost migration.

This alternative is certainly a desirable goal for the long term but a great deal of groundwork must be prepared first in order that contractors as well as the taxpayer receive equity in the transition.

**METHODOLOGY USED TO ADJUST MARKUP POLICY** - The following methodology was used to achieve the overall objectives of the recommended markup policy change.

- o Contractor Effort. The objectives were to lower the emphasis on cost, reduce the number of cost elements, and narrow the weight ranges. 1981-1983 historical data was used and contractor effort factors were reduced by 40% under Alternative I and 25% for Alternative II. Narrower weight ranges, which bracketed the reduced averages, were then established.
- o Risk -
  - o Cost. The objective was to reduce the risk on cost factor by the implicit amount of the cost of contract financing and to provide a method to reward higher risk markup for longer contracts, since risk is partially a function of time. In addition, it was desired to make the risk factor more directly linked with the contractors cost share ratio on incentive contracts. The basic rules for determining the risk markup factor on costs are:
    - Firm-Fixed-Price. 4-5% (depending upon the degree of technical risk) plus an additional .035% per month for every month over 12 that the contract requires until the last significant delivery is scheduled.
    - Fixed-Price Incentive. Risk markup determined under the firm-fixed-price rules multiplied by the contractor's share of overtarget cost.
    - Cost-Plus-Incentive-Fee. The difference between a target fee determined under CPFF rules and the contract minimum fee multiplied by the contractor's share of overtarget cost. This amount would be added to the target fee determined under CPFF rules.
    - Cost-Plus-Fixed-Fee. 0-.5% (depending upon the degree of technical risk).
  - o Facilities Investment - The objective was to provide some differentiation in markup for facilities use to discriminate between those assets which are likely to be more productivity enhancing from those that are not. Land no longer will receive any risk markup and buildings will be allowed 1/2 of the markup allowed for equipment.

o Working Capital Costs:

The objective was to provide a simple, but explicit, method within the markup policy to provide for the imputed cost of working capital. A very detailed method for achieving this same objective had been attempted under DPC-107 and had failed because it was overly precise and complex. However, a much simplified method, similar to that used in DPC 107, can arrive at an amount that, while not exactly precise, is precise enough for purposes of establishing a prenegotiation markup objective. This markup amount is determined by the following steps.

- o The total amount of working capital costs the contractor is expected to finance is derived by multiplying the contract costs by 100% minus the progress payment rate.
- o The average working capital is determined by multiplying the contractor total working capital costs by the average time working capital is required. The average time is determined by:
- o Multiplying individual delivery values times the number of months from contract start until each delivery.
- o All of these monthly weighted values are summed.
- o The sum is then divided by the total price of the contract to yield the monthly weighted working capital required.
- o The monthly weighted working capital is then converted into a yearly average number by dividing 24 (12 months x 2).
- o The working capital markup is determined by multiplying the average working capital required by the prime interest rate.
- o The working capital markup can also be expressed as a percentage of total cost.



## ALTERNATIVE 2

## CURRENT POLICY

FACTOR	WEIGHT	FACTOR	WEIGHT	FACTOR	WEIGHT
<u>Contractor Effort:</u>					
Direct Materials:		Material & Other	1-3%	Material & Other	2-4%
Purchased Parts	1 to 4%	Direct Effort	5-9%	Direct	6-10%
Subcontracts	1 to 4%	Overhead and G&A	3-5%	Overhead	4-6%
Other Materials	9 to 15%	Facilities Cost of Money	0	Total Prime Costs	
Engineering Overhead	6 to 9%	Total Costs		G&A	0
Manufacturing Labor	5 to 9%			Facilities Cost of Money	0
Manufacturing Overhead	4 to 7%			Total Allowable Costs	
Services Labor	5 to 15%				
Services Overhead	4 to 8%				
G&A Expense	6 to 8%				
Adjustment Factor Deduction	(30%)				
Contractor Risk	0 to 8%	<u>Risk:</u>		<u>Risk:</u>	
Facilities Investment	16 to 20%	Cost	0-5%+	Prime Cost	0-5%+
Special Factors:		FMS	0-2%	FMS	0-2%
Independent Development		Facilities Investment:		Facilities Investment:	
Productivity	1 to 4%	Buildings	6-10%	Buildings	6-10%
Other	N/A	Equipment	16-20%	Equipment	16-20%
Cost of Money Adjustment	N/A				
		<u>Working Capital Costs:</u>		<u>Working Capital Costs:</u>	
		Total Allowable Costs		Total Allowable Costs	
		X 1 - Progress Payment Rate		X 1 - Progress Payment Rate	
		= Contractor Working Capital		= Contractor Working Capital	
		x Delivery Midpoint + 2 (years)		x Delivery Midpoint + 2 (years)	
		= Average Working Capital		= Average Working Capital	
		x Prime Interest Rate		x Prime Interest Rate	
		= Working Capital Costs		= Working Capital Costs	

## Glossary of Abbreviations

AFSC - Air Force Systems Command  
AMC - Army Materiel Command  
ASM - Annual Survey of Manufacturers  
ASPR - Armed Services Procurement Regulation  
B&P - Bid & Proposal  
CAS - Cost Accounting Standard  
CASB - Cost Accounting Standards Board  
CBO - Congressional Budget Office  
CITP - Contractor Input to Total Performance  
CMF - Facilities Capital Cost of Money Factors Computation  
COM - Cost of Money  
CPFF - Cost Plus Fixed Fee  
CPIF - Cost Plus Incentive Fee  
DAC - Defense Acquisition Circular  
DCAA - Defense Contract Audit Agency  
DFAIR - Defense Financial and Investment Review  
DGM - Durable Goods Manufacturers  
DIAC - Defense Industry Advisory Council  
DIB - Defense Industrial Base  
DLA - Defense Logistics Agency  
DMDC - Defense Manpower Data Center  
DoC, BEA - Department of Commerce, Bureau of Economic Analysis  
DoD - Department of Defense  
DPACT - Defense Policy Advisory Committee on Trade  
DPC - Defense Procurement Circular  
DSAA - Defense Security Assistance Agency  
EPA - Economic Price Adjustment  
FCE - Facilities Capital Employed  
FFP - Firm Fixed Price  
FMS - Foreign Military Sales  
FPI - Fixed Price Incentive  
FTC - Federal Trade Commission  
FY - Fiscal year  
FYDP - Five Year Defense Plan  
G&A - General and Administrative  
GAO - General Accounting Office  
GNP - Gross National Product  
ICA - Independent Cost Analyses  
IG - Inspector General  
IMIP - Industrial Modernization Incentive Program  
IR&D - Independent Research and Development  
LMI - Logistics Management Institute  
MANTECH - Manufacturing Technology Program  
OMB - Office of Management and Budget  
OP - Operating Profit  
PP - Progress Payment  
PPSSCC - President's Private Sector Survey on Cost Control  
QFR - Quarterly Financial Report  
R&D - Research and Development  
ROE - Return on Equity  
ROI - Return on Investment  
ROS - Return on Sales  
TECHMOD - Technology Modernization Program  
USA - United States Army  
USAF - United States Air Force  
WGL - Weighted Guidelines

## FOOTNOTES

1. Deputy Secretary of Defense memorandum, "Defense Contract Pricing, Financing, and Profit Policy," December 2, 1983.
2. House of Representatives, Committee on Armed Services, Report of the Defense Industrial Base Panel, "The Ailing Defense Industrial Base: Unready for Crisis," December 31, 1980.
3. Deputy Secretary of Defense memorandum, "Improving the Acquisition Process," April 30, 1981.
4. Office of the Assistant Secretary of Defense (Installations & Logistics), Profit '76 Summary Report, December 1976.
5. Kaplan, Robert S., "Yesterday's Accounting Undermines Production," Harvard Business Review, May-June 1984.
6. Owens, Dr. M. T., "Congress' Role in Defense Mismanagement," Armed Forces Journal, April 1985.
7. Deputy Secretary of Defense memorandum, "Defense Contract Financing Policy," October 14, 1950.
8. Army Special Regulation No. 715-35-5, NAVEXOS No. P-1006, and Air Force Regulation No. 173-133, "Defense Contract Financing," March 17, 1952.
9. Secretary of Defense memorandum, "Defense Supply Contract Financing--Progress Payments Based on Costs," February 12, 1954.
10. Defense Procurement Circular No. 94, November 22, 1971.
11. Defense Procurement Circular No. 96, December 21, 1971.
12. Under Secretary of Defense for Research and Engineering memorandum, January 12, 1981.
13. Acting Deputy Under Secretary of Defense for Acquisition Policy memorandum, March 3, 1981.
14. Acting Deputy Under Secretary of Defense for Acquisition Policy memorandum, August 28, 1981.
15. President's Private Sector Survey on Cost Control, "Report on Financial Asset Management," September 15, 1983.
16. Congressional Budget Office and General Accounting Office, "Analysis of the Grace Commission's Major Proposals for Cost Control," February 1984.

17. General Accounting Office, Report to the Chairman of the Senate Committee Governmental Affairs, "Compendium of GAO's Views on the Cost Saving of the Grace Commission," GAO/OGC-85-1, February 19, 1985.
18. Department of Defense Inspector General, "DoD Policies on the Use of Progress Payments," April 10, 1985.
19. Under Secretary of Defense for Research and Engineering memorandum, "Draft Report on the Audit of the DoD Policies on the Use of Progress Payments," August 27, 1984.
20. Office of Management and Budget, Attachment 1 to OMB Circular A-125, "Prompt Payment," July 10, 1984.
21. Under Secretary of Defense for Research and Engineering memorandum, "Attachment to OMB Circular A-125," August 14, 1984.
22. Cost Accounting Standards Board, Staff Paper No. 48, "Cost of Money Related to Investment in Operating Capital," May 15, 1978.
23. Deputy Under Secretary of Defense for Acquisition Management memorandum, "Implementation of OMB Circular A-125," January 4, 1983.
24. Director of Cost, Pricing, and Financing memorandum, Office of the Under Secretary of Defense for Research and Engineering, "Progress Payment Analysis," June 8, 1983.
25. Promulgation Comments, Standard 414, 41 F.R. 22241, June 2, 1976.
26. Senator William Proxmire's letter to the Secretary of Defense, May 27, 1976.
27. Comptroller General of the United States. Recent Changes in the Defense Department's Profit Policy - Intended Results Not Achieved. GAO Report to Congress, PSAD-79-38, March 8, 1979.
28. Air Force Systems Command, Profit Study '82 Summary Report, December 1982.
29. Defense Acquisition Circular No. 76-23, February 26, 1980.
30. Federal Reserve Bank of New York Quarterly Review, "What Is Behind the Capital Spending Boom?", Winter 1984-85.
31. Dhrymes, P. J., and Kurz, M., "Investment, Dividend, and External Finance Behavior of Firms," in Determinants of Investment Behavior, (New York: Columbia University Press for National Bureau of Economic Research, 1967).
32. Gansler, Jacques S., The Defense Industry, (Cambridge, MA: The MIT Press, 1980).
33. Hulten, Charles R. and Robertson, James W., National Tax Journal, Vol. XXXVII, March 1984.
34. Defense Policy Advisory Committee on Trade, First Report, December 15, 1983.

35. Director of the Defense Security Assistance Agency memorandum, "Contractor Profit Under Foreign Military (FMS) Contracts," June 22, 1984.
36. United States Air Force FY84 Production Base Analysis, February 1984.
37. Holtsclaw, Keith S., "Capital Investment Motivational Techniques Used By Prime Contractors on Subcontractors," Master's Thesis, Naval Postgraduate School, Monterey, CA, December 1984.